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Study for Proposed Reredos, Holy Trinity Church, Chelsea.—Mr. H. Wilson, Architect.....*Extra Large Ink-Photo.*

A Summer Cottage for the Undercliff, Niton, I.W.: Mr. Victor T. Jones, Architect.—Portion of a Design for Bexhill Local Board Offices: by Mr. Thomas Davison, A.R.I.B.A.—Competitive Design for Darlington Municipal Buildings: by Mr. F. Pennington .....*Double-Page Photo-Litho.*

New Conservative Club House, Glasgow.—Mr. R. W. Edis, F.R.I.B.A., Architect .....*Double-Page Photo-Litho.*

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The Housing of the Agricultrual Labourer.

THE fifth volume of the report of the Royal Commission on Labour, produced under the supervision of Mr. W. C. Little, the senior Assistant Agricultural Commissioner, sums up, among other things, the result of the enquiries into the condition of rural tenements of the smaller class. For the general purposes of this volume of the Report, a certain number of districts were taken, enclosed within a circumference of about twelve miles diameter each. These are marked and distinguished by numbers on the index map accompanying the Report. Under the general heading "Cottage Accommodation," the subject of dwellings is treated under the four sub-divisions of "Supply," "Situation," "Condition and Construction," and "Ownership and Tenure." The last is a matter of social politics only indirectly connected with our special subject. Under the other three sub-divisions we find information which is of a good deal of interest.

In regard to "supply" (of dwellings), we find that the general tendency of all the reports made by the various Assistant-Commissioners is that cottages are sufficient in number for the present population, but that they are unevenly distributed, scarce in some places, and redundant in others. The fact that, in spite of the steady increase of population in the country as a whole, the supply of labourers' cottages is, on the average, sufficient, although building and re-building have only taken place to a very slight extent, is one of the most practical illustrations we could have of the modern tendency to centralisation of the population in towns. Everywhere in cities comes the complaint of overcrowding, of difficulty in finding dwellings for the poorest class, while in the country the number of dwellings is in many places rather diminished than increased, and "the diminution in the number of cottages has not kept pace with the loss of population." In some parts of the country, however, the case is otherwise; the dwellings are too few. This is the case in the Woburn district, where, says Mr. Bear, the Assistant-Commissioner for that district, this is owing mainly to the demolition of old and bad cottages, without a corresponding erection of new ones. One parish is named where five cottages have taken the place of twenty-four.

Throughout the report on cottage accommodation we find a distinction drawn between the condition of things in "close" and "open" villages; *i.e.*, those which are the property of one landowner and those in which there is a multiplicity of rival ownerships. As far as supply of tenements is concerned the "close" villages are the worst off. Assistant-Commissioner Richards observes that where there is one owner upon whom alone rests the obligation to rebuild or repair cottages which have become decayed, and owing to the decreased acreage of arable land the demand for cottages has decreased, "advantage has been taken of every opportunity of getting rid of an investment which often brings more trouble than profit." On the other hand, in "open" villages there is sometimes an apparent abundance of dwellings owing to the existence of a number of life leasehold cottages, which, having no permanent present owner, are allowed to decay, and are in reality no longer fit for habitation, but which produce, on a casual inspection of the district, an appearance of an over-abundance of dwellings which further inquiry proves to be illusory. Generally speaking, however, the Report on this head leaves the impression that the great want in rural districts is not, as a rule, more cottages, but better ones. There are places noted where there is an insufficiency of dwellings, as proved by the admitted fact that when a couple marry they are obliged to live with the parents of one of them till a vacant cottage can be found. But the summary of the whole matter is that "as compared with the past there are everywhere fewer cottages, but in proportion to the population more."

In regard to "situation" the question of proximity to work becomes important, and here the Report sketches a state of things in which dwellings seem to be placed in a most accidental manner, without any regard to the consideration as to where they are most wanted. This is in the main the fault of landowners, who appear to build cottages in any out-of-the-way corner where it is convenient and cheap to do so; where the land, we may suppose, is not wanted for other and more lucrative purposes. In regard to the Monmouth district, Mr. Richards reports:—

"The cottage question is regarded, and justly so, by the labourers as the burning question of the district. There are not two opinions as regards their situation. Unless by the merest accident, they are very inconveniently situated. They are so scattered, dotted up and down on the hill sides, that it is quite an accident if a labourer has a cottage convenient to his work. The few cottages that may happen to be near a mansion or a large farm are occupied by the personal retainers of the owner or resident, while the labourers have to walk all distances from one to five miles to their work."

In other districts, such as Basingstoke and Thakeham, which are specially mentioned in this respect, it is reported that the cottages are very conveniently placed on or in contiguity to the farms. In some instances, as in the district of North Witchford, there are historical explanations to be found for the inconvenient position of the cottages. This is a place in the Fen district, and the Assistant-Commissioner, Mr. Chapman, who reports on this district, observes that the villages were originally built on islands in the Fens, which gradually became centres of an increasing population, while on the outlying lands (since reclaimed, we presume) there are thousands of acres unprovided with cottages, the labourers walking out from the villages to their work. Whether the labourers in these districts complain of this state of things we are not told; but in regard to some other districts we do learn that the labourers (and perhaps more often their wives) have acquired such an inherited taste for village life that nothing will induce them to live on the cottages provided for them on outlying farms; that men have been known to refuse cottages on farms, with good gardens and rent free, and prefer to pay 3*l.* or 4*l.* a-year for cottages in villages or towns, where they have no gardens, and where they have to walk two or three miles to their work. This is apparently only another phase of that increasing tendency to centralisation which culminates in leading the labourer to desert the land altogether and determine to try his fortune in a city; though Mr. Bear, the Commissioner who reports the facts just named, thinks that it is a great deal from the influence of association and bringing up, and that if cottages for the agricultural labourers had been built on the farms in the first

instance, there would have been no difficulty in filling them. If, however, the labourers are averse to separate cottages when built on the farms and in convenient contiguity to their work, it is easy to understand what a cause of complaint they must find when, as in the case of the Monmouth district before-mentioned, solitariness of situation is combined with distance from their work, and cottages are placed with no consideration at all for convenience of situation. It seems hardly possible that any legal enactment should be applicable to such a difficulty; it would be impossible to define the requirements with any legal precision; it must be left to the influence of public opinion in leading landlords to recognise better the duty laid on them to consider the convenience of their tenants and labourers, in selecting sites for cottages, unless they prefer to wait till the progress of education and combination puts the latter in a position to force more consideration from them. The following summary in the Report of the causes which may have led to the unequal and inconvenient distribution of dwellings is of sufficient interest for quotation:—

"The present distribution of cottages is, no doubt, the result of causes which have been long in operation, though some of them have, no doubt, been less potent of late than they formerly were. Apart from the circumstances which led to the early settlers choosing fertile spots near running water, and clustering their habitations together for mutual protection and safety, the agrarian system of open commonable fields which prevailed over a large part of the country up to the early years of the present century must have been a great barrier to the distribution of cottages. In those parishes where the largest proportion of owners of land was to be found, there was no land outside of the village ring available for cottage sites, all the arable land being held subject to the common right of grazing in the fallow year and at other periods, and the grass was lotted meadow or common pasture, which the owner, as a tenant of the manor, could not inclose. The lord of the manor could, of course, build on his demesne, but he had no particular object in doing this, if the increasing population of the village supplied the labour required by the farmer.

One great cause for the irregular distribution of cottages was the system of parochial responsibility for pauperism, which existed until 1865. Owners of cl se parishes had up to that time a strong motive for restricting the number of the resident population of those parishes to that of the barest minimum required for the constant service of the farmers, thus avoiding, as much as they could, the burden of pauperism. The restriction in the number of cottages in the close parishes stimulated the building of them in neighbouring parishes in which the labourers had to congregate. The Union Chargeability Act of 1865 removed the great obstacle to cottage building by estate owners, and there can be little doubt as to its having led to a considerable improvement; but the effects of the old system are still observable in many districts."

We now come to the most important point dealt with in the Report, the character and construction of the cottages themselves. In regard to this the Commissioners report that in every district inspected there was found to be a great variety in the cottages, and some of the worst and best might be found in the same district. Here again, however, we meet with the distinction between "close" and "open" villages, but this time the difference is in favour of the close village, the property of one owner. The cottages in this case are generally better built than in the "open" villages, where the property is divided and no one person has a feeling of paramount responsibility with regard to its condition. It is noted also that cottages which form part of the general equipment of a landed estate, provided by the landowner for the accommodation of those working on the land, are generally superior to and kept in better order than those which are built without any connexion with farms, and hired from owners who make money from letting them. This is exactly what we should have expected, and yet these are the class of cottages, as observed above, which the labourer in many places is unwilling to occupy. Clearly the prejudices and fancies of the agricultural labourer are to some extent answerable for the difficulty of housing him properly. The provision, by the owner of an estate, of dwellings for the labourers on it is one of the most obvious and convenient arrangements possible for the latter, and by keeping the dwellings under the eye of the master and avoiding the waste of time and strength involved in long distances to and from work, it is probably in the end the best course for the owner; but in the first instance it is probably in most cases done at a loss, or at an entirely inadequate return, and the landowner appears to get from the labouring class very small thanks for an outlay which is more obviously and directly in their interests than in his own. And the Commissioners report generally that while improvement has taken place in agricultural dwellings, and is still in progress, this is nearly always on the estates of large landed proprietors; and that elsewhere a large proportion of such dwellings are below the proper standard of decency and comfort, and many of them are in a wretched condition. Those are always the worst which are to be found in "open" villages where men have bought or built houses on speculation, and on waste land where labourers have built houses for themselves. The latter, we are told, are almost invariably the worst of all. So that it would seem that the much-abused capitalist after all does much better for the labourer in the way of house accommodation than the labourer would ever do for himself.

Among the neighbourhoods specially mentioned for praise or blame in regard to their cottage buildings, it is recorded that Norfolk and Suffolk include both the worst and the best examples; the worst, as usual, being the property of small owners, and the best those of the large landed-proprietors. The Southwell Union contains fewer bad cottages than the Commissioner had seen in any other district; the Thakeham Union bears a good character, as well as that of Hollingbourn, in relation to which it is noted that Kent as a whole is very superior to Wiltshire or Dorsetshire in cottage accommodation. The Monmouth Union is one of the worst; in the course of five days driving the Commissioner did not see more than half-a-dozen really good cottages. North Witchford in Cambridgeshire is another district cited as exceedingly bad.

Let us see what is to be said more in detail as to the character and construction of the cottages. In Kent a good many old farmhouses have been turned into cottage dwellings, with excellent results; this, we presume, is in the neighbourhood of places where modern farm buildings and dwellings have been erected. The cottages themselves are constructed either of brick or weather-boarding, with tile roofs (it is not stated on what backing the weather-boarding is placed), or sometimes of lath and plaster; on the chalk hills sometimes of flint. They have generally two rooms downstairs and two upstairs, but the more recent ones have generally three rooms upstairs. These are the Kent cottages, and we cannot think the report satisfactory, considering what a very inadequate material lath and plaster is for winter housing in. Those who have ever slept in an upper lath-and-plaster bedroom in an old farmhouse on a frosty night, and risen to find their sponge and water frozen, and the sensation as of getting up in the open air, will understand what an inadequate kind of defence such walls must be for living within all the winter round; and if, probably, the rural labourer is more hardy in this respect than the habitual dweller in towns, it can hardly be doubted, nevertheless, that this frail kind of housing must have a deleterious effect upon his standard of health and that of his children. The small number of bedrooms is, of course, another very serious drawback, and it is, at all events, well that in the newer cottages the two rooms are being subdivided into three.

The Report classifies cottages into three general heads: (1) Well-built ones of modern construction, and with the requirements of sanitation properly attended to; (2) Fairly good cottages of old construction, and built without special regard to sanitary conditions; (3) Thoroughly bad ones, out of repair, and deficient in proper accommodation of every kind. The first are, as might be expected, the least numerous, but are steadily increasing in number. The second class are found everywhere, and made of all kinds of material, and are generally, it is said, comfortable enough, and no complaint is made of them, but they are generally small and deficient in number of rooms, and consequently often overcrowded. One Commissioner describes this class of cottage as containing, as a rule, one sitting-room of fair size, about 12 ft. square and 7 ft. high, and two bedrooms, which have not separate access. There is often no fire-place in a bedroom, and the windows are on the floor level, so that no proper ventilation can be obtained. A nearly similar description is given by another Commissioner, with the observation that into one of the bedrooms the staircase often leads. As these are two-storied houses, we must presume that the area of about 12 ft. square, given as the average size of the sitting-room, has to suffice up-stairs for the two bedrooms, minus the piece cut out of one by the staircase. This seems bad enough, but this is the class of cottages spoken of as fairly good—the second class. The best room, it will be observed, is only 7 ft. in height; while most local by-laws have long ago demanded 8 ft. as the minimum of height for the humblest class of living-rooms in town dwellings. A local variation on this widely-spread type is found in the Glendale district (Northumberland), and is thus described by Mr. Wilson Fox, one of the Assistant Commissioners:—

"The houses are generally built on one floor, and go by the name of 'two-end houses.' Although some new ones are now being made with a story above, many 'two-end' ones are still being built, as they usually prefer them, partly perhaps from habit, partly because they dislike the trouble of going up and down stairs, and also because they only necessitate the burning of one fire. A 'two-end' house usually consists of a good-sized kitchen, which is used both as a living-room and a sleeping-room, often about 21 by 16, and one other smaller room, a small pantry or back kitchen, and a loft above the kitchen and communicating with it by a ladder, in which some of the family often sleep."

Though the partially-used sleeping-loft is a drawback, the "two-end house" certainly seems to be a better institution, where there is plenty of ground space to be had, than the previously described two-story cottage, with its only bedrooms probably almost entirely in the slope of the roof, and their windows level with the floor.

A long quotation from the report of Mr. J. C. Thresh on houses in the Chelmsford and Maldon Rural Sanitary districts gives us some further information as to the condition of the dwellings of some of the agricultural labourers. The character of the cottages varies much in the different villages. In some there are but a few of the old lath-and-plaster cottages roofed with thatch, mostly with large gardens. In others houses of the same class are crowded together, so old and dilapidated that they are really unfit for human habitation. They are built with a timber framework, studded outside with laths and daubed over with plaster, or with a mixture of clay and chopped straw. The "walls" are sometimes not an inch in thickness, not even lined with lath and plaster inside; where the laths are decayed the fingers can easily be pushed through, and whenever a piece of plaster falls off outside the interior is exposed. The floors downstairs are usually of brick laid directly on the ground, and reeking with damp. The roof is of thatch, and the bedrooms are almost invariably in the roof; and if there is more than one bedroom, the one is generally entered through the other.

"The windows are small, formed of small panes of glass let into a leaden framework. These windows are usually of the most rickety description, and often do not open, but this defect is atoned for by the ease with which the air can obtain access to the room around the side of the defective frame. The utmost

care has to be taken when cleaning them to avoid pushing them out. In fact, in many cases I do not know how the housewife contrives to rub the panes, without someone is pushing against them outside, to prevent a catastrophe. Where a back window has been so pushed out the opening is usually found covered over with a piece of matting. The doors are of the rudest description. Probably when originally made there was some pretence to 'fitting,' but there is none now. To keep out the draught bits of listing or pieces of wood have been nailed along the edges or over the cracks, but the result is rarely satisfactory. The fireplace, and usually there is only one in the whole house, is of the most primitive character. A few iron bars are set in the brickwork, and as if further to prevent any economy in fuel, the bricks at the back crack and crumble away and rarely get replaced. The chimney corners are large, and the chimneys wide, admitting sometimes of freer ingress for the external air than of egress for the air inside and the smoke from the fire.

Complaints are made of the draughtiness of even the best of these cottages. Often in winter the candle or lamp is said to be blown out, and yet it is impossible to tell where the draught came from. The ceilings are usually not underdrawn, and when the bedroom floor is in holes one can see into the room below.

Very few of these cottages have more than two bedrooms, many of them have only one, and usually, from their being placed in the roof, it is only possible to stand upright in the middle. The living-rooms are low, many only from 6 ft. to 6 ft. 6 in. in height, yet the floor space is usually larger than the majority of the more modern cottages."

When we come to that part of the report in which is condensed into a small space the result of a great quantity of evidence in regard to drainage and water supply, we are confronted with the same class of facts which we have over and over again brought before our readers in connexion with the special reports made to the Local Government Board in regard to the causes of the outbreak of disease in various rural districts in England. Except in some of the larger villages, anything that can rightly be called drainage is unknown. Surface water and house refuse are carried to brooks or cesspools in open gutters. The number of privies is being generally increased, though it is still, apparently, quite common to find only one privy to three or four cottages, "and in Truro it is a common thing to find a whole row of cottages without any privy accommodation at all." Then (as we all know) one of the great difficulties in the agricultural labourer's life almost everywhere is the absence of good water. "Cottages with thatched roofs depend upon the rainfall" (imagine what a delightful source of "pure water" supply!); and when that is insufficient the occupiers must buy water from their neighbours or drink what they can get from the dykes, brooks, or ponds (which are often the receptacle, directly or indirectly, of the refuse from the houses). Not long since we were in a rural parsonage house in Sussex where the clergyman informed us that he could procure no water for drinking or cooking purposes nearer than a quarter of a mile from his house. This is almost intolerable even to a man who has servants to send for it; what must it be to the labourer who has no such extra assistance? From Monmouth also it is reported that in general no provision is made for a water supply. "If the cottage happens to be near a spring, well and good. If not, cottagers must go for the water. At Ganvay, Tregare, and other villages, the labourers have to go from half to three-quarters of a mile for good water, or use any impure water which may be more convenient." Can we wonder at the frequency of those outbreaks of disease which bring down the Local Government Board Inspector to make his report, to state the same facts and make over and over again the same recommendations, which it seems to be no one's duty to act upon?

As to the remedies for these evils the Report naturally can make only some rather general suggestions. The business of a report of this kind is mainly to get at and classify facts. In regard to the water-supply problem no suggestion is made; and it is obvious that such a legislation as is established in London, of condemning a house as insanitary which has not a proper water-supply, would in the present state of things be often impracticable in the country, as it would be demanding of the property owner what is beyond his powers, and would be met by a *non possumus*. Water-trading companies are not likely to be formed where the prospect of a remunerative return is more than doubtful; and to lay on the Rural Sanitary Authority the duty of providing a water-supply would be imposing on it a very serious burden in cases where no rate that could possibly be recovered could come near to recouping the outlay. Yet surely something ought to be done. The Report suggests Government loans towards the building of better houses where required. Possibly the same method might be applicable to water-supply. In regard to the improvement of dwellings the Report goes to show that this also cannot in most cases be remunerative, and that where large landowners have done much in the way of rebuilding, it has been at a direct loss; considering which, it is highly creditable to such owners that so much has been done, and that their estates are almost invariably the best provided in cottage accommodation. The average rent obtainable from the poorest class of rural cottages seems, from the statistics contained in the Report, to range between 1s. 3d. and 1s. 9d. a week. It is remarked that the necessary accommodation for a full-sized family cottage must comprise three bedrooms, a pantry, a living-room, kitchen, and wash-house, a closet and coal-house. "The average cost of a cottage of this description, properly constructed and fully equipped, cannot be put at less than 125*l.*, exclusive of the value of the site." This seems to us a very low estimate, and it is admitted in the Report that 200*l.* or upwards is frequently spent, on large estates, on a single cottage for which no higher rent than the average named above can be obtained. But even taking the 125*l.* as possible, no remunerative return can be expected under the present condition of things; and although, as observed in the report, the large landowners may build such cottages from philanthropic motives, the ordinary owner cannot follow their example. The three directions in which the author of the Report suggests the possibility of approaching "a more satisfactory adjustment of outlay and return" are stated as follows:—

"I. To reduce the original cost by the adoption of the best plans for economising space and construction and the use of materials most readily available.

II. By loans at a low rate of interest.

III. By an adjustment of rent in proportion to the character and amount of accommodation afforded."

In regard to the last suggestion it should be mentioned that the Report goes to show that the amount of rent has generally very little relation, beyond certain limits, to the size or capacity of a cottage; a cottage, good or bad, roomy or otherwise, is a cottage, and rent in the same district varies little with the desirability of the dwelling. In regard to the question of cheaper material and construction, Mr. Little mentions his observation of one method of construction which he seems to think worth consideration:—

"I may, in passing, mention that I have recently had the opportunity of seeing some cottages and other buildings erected by Sir Walter Gilbey, Bart., the walls of which were constructed of clay-lump made and dried on the spot. I was shown a wall of this material which had been removed to its present position nearly fifty years ago, and it was still sound. The essential conditions for the use of this material, as for that of the old cob walls in Devon, are that the walls should have 'a good foot and a good hood,' a foundation of brick, stone, or concrete, a damp-proof course above the ground-line, and an overhanging eave. One of the great advantages of the use of this clay-lump is that the walls may, at a moderate cost, be made of a considerable thickness, a condition which adds immensely to the comfort of the cottage."

The thickness is an important point, certainly, but it is impossible to regard walls so formed as very satisfactory from a sanitary point of view. What about their condition in a continued spell of rainy weather?

As to number III. of the above-quoted suggestions, it must not be forgotten that the indifference of the labourer himself is to some extent to blame. As it is truly observed in the Report, the landowner who gives the labourer a cottage for a rent which does not repay him for the building of it, is really paying him a higher wage than the labourer believes he is receiving. But the labourer does not see it in that way, and, as we have seen, often prefers to pay a high rent for a bad cottage in a village, rather than a low rent for a good cottage on a farm. This fact affords the justification for the sentence with which this section of the Report concludes, to the effect that "no great and lasting improvement will be effected in the housing of the agricultural labourer until his sense of self-respect and his regard for his family impel him to demand better cottages and inspire him to make some sacrifice in order to obtain them." The awakening of the agricultural labourer to this view of the subject would probably prove the most powerful force in effecting a reform that could be brought to bear. But it will probably be another generation before this force comes into extended practical operation. In the meantime, every owner who builds a good cottage where a bad one existed before is helping the good cause, and educating the agricultural labourer to the perception of a healthier standard of living; and as adequate financial return seems out of the question, he must make the most of the proverbial reward of a good conscience.

NOTES.

CONSIDERABLE progress has now been made with the construction of the tunnel under the Thames at Blackwall. It will be remembered that at each end of that portion of the tunnel that is under the river, a large circular caisson had to be sunk, the ultimate function of which was to form an air-shaft. Of these, that on the Greenwich side of the river has been sunk to its required depth, and the other is now being sunk, the material from within it (mostly gravel) being excavated by an ordinary mechanical grab or digger, worked by a steam-crane, although provision was made for sinking it by the pneumatic process. In addition to these caissons, there are two others a few hundred yards further in-shore. These will ultimately contain the stairs for the use of pedestrians wishing to use the tunnel, and who are near the banks of the river. Of these two caissons, that on the Greenwich side is sunk to the required depth, but very little has yet been done to the one on the other side. The tunnel is completed between the two caissons on the Greenwich side, and work has now commenced on that portion under the river, the start being made from this side. The shield used in the construction of the tunnel has advanced a short distance beyond the caisson, the rate of progress under the river being at present from 3 to 5 ft. a day. No steps have been at present taken to commence the tunnel proper on the Blackwall side, but the approaches on both sides of the Thames are well advanced. Although a good deal of work has already been done, the really difficult portion of the undertaking—namely, boring under the river, has only just been commenced.

LONDON is again having one of its frequent series of extensive fires. The Bermondsey fire was the most important one last week, as the insurance claims have already exceeded 100,000*l.* This fire afforded us another excellent example of the result of bad construction, and a site which prevented the firemen doing good work. This week the Dalston timber-yards again gave us an opportunity of fully appreciating the risks attendant on the large storage of highly combustible materials in our very midst. We have referred to this matter before, and mentioned how risks of this

kind are minimised on the Continent. London may not always be so fortunate as to have calm weather with its dangerous conflagrations. A gale of wind will then prove disastrous. As regards the handling of the "C" division of our fire brigade at the Dalston yards, the tactics of their superintendent seem to have been very successful, and his efforts were greatly appreciated.

COMPLAINTS of what has been termed "the impotence of Parliament" are by no means confined to any one party or class. Mr. Emerson Bainbridge, in summing up the lessons of the coal strike last year, complained that our legislators shelved the Arbitration Bill, and busied themselves with measures in which the country appeared to evince but little interest; "whilst millions of troubled people were anxiously looking and longing for some solution of the deadlock which had been pressing heavily on everyone's mind for months." Last week the President of the Associated Chambers of Commerce took up the parable, lamenting the "inability or unwillingness" of Parliament to deal with commercial affairs—instancing the Railway and Canal Traffic Act, which he described as being pushed through rather than passed. At the same time, Sir Albert Rollit could fairly claim to have achieved a certain amount of success, and Sir Courtenay Boyle rightly observed that the passing of this Act marks a decided step in the direction of a settlement of the long controversy between the companies and the commercial community. Sir Albert Rollit is sanguine, and does not despair of the legislative body of which he complains, and to which he belongs. He considers that although the Act only provides that the reasonableness of *increased* rates may be the subject of appeal, there is every probability of an extension of this principle. But the railway companies will now, perhaps, endeavour to be reasonable without further legislative incentive.

THE use of chilled metallic shot has completely revolutionised the stone-sawing trade, by reason of the rapidity with which the work can now be accomplished as compared with the times when the sawing material consisted only of quartzose sand. It is obvious that in sawing granite, for instance, the sand alluded to, not being harder than quartz, was incapable of doing much work, as that mineral exists so abundantly in granite. What was wanted was something harder than quartz. Several minerals answered the purpose, amongst which were corundum (emery) and the diamond. The former of these is occasionally used for sawing, and largely for rubbing granite, marble, and tho like, preparatory to the polishing process; the latter has for some years been employed to a limited extent for sawing the hardest kinds of stone, and diamond discs may be found in the workshops of every lapidary. But these minerals are rather expensive, especially the latter, and until within recent years sharp sand was still almost universally employed. Then a new material, known as chilled shot, was introduced, and was rapidly taken up. During our visits to various granite centres in 1886-87 we found it had already gained a firm foothold, as the rate of sawing was greatly increased by its use; it was also very economical in working, and has been much employed to this day. The foregoing observations were suggested by some samples and a trade description of "Krushite" recently sent to us, which is said to be a new material. It appears to be chilled metallic shot, and is very similar to, though probably not identical in composition with, what we saw in use some eight years since. At any rate, the use of chilled metallic shot for sawing hard stone is by no means a "new" idea either here or in America. "Krushite" is said to be capable of sawing blocks of granite at the rate of 4 in., and hard grit-stone at 9 in. in depth per hour, with twelve blades in the frame. It is manufactured in several different sizes, the largest (about the size of small rabbit-shot) being suitable for sandstone, and the smallest (fine dust) for the rubbing-bed. The material is used in sand-blast apparatus in lieu of sand, and in substitution for diamonds in boring and drilling. It is described as being absolutely without points or edges, though we do not find this statement borne out by the samples sent. However, there can be no question that the chilled metallic shot is by far the best and most economical material hitherto discovered for sawing the hardest descriptions of stone, and for use in the initial stages of rubbing. It must be handled with great care, though, in the manufacture of marble. Only the other day we saw a beautiful slab utterly ruined, during the final polishing with putty powder, by reason of a few chilled shots having found their way under the felt polisher, with the result that the smooth surface of the stone was deeply scored before the machinery could be stopped. That, of course, is sheer carelessness; the fact that the chilled shot was capable of scratching so deeply in such a short space of time is distinctly in its favour as a sawing material.

MUCH attention has recently been given to the testing of hydraulic cements, probably owing to the failures that have occasionally occurred, from not very obvious causes, in large and costly engineering undertakings. No experienced engineer using these materials would omit to have them properly tested and analysed before allowing their use in work for which he was responsible. It is only comparatively lately that it has been recognised that the coarser particles of a hydraulic cement, certainly all that would remain on a sieve having seventy-six meshes per linear inch, and probably many that pass such a sieve, are either wholly inert or so slow in setting as to be useless. The questions of fineness, weight, time of setting, and tensional and compressive strength, are all of the greatest importance, and those who are interested in the subject will find concise information on the latest methods of ascertaining these various qualities in the paper contributed last May, by Mr. W. H. Stanger, M.Inst.C.E., and Mr. Blount, to the London section of the Society of Chemical Industry.

THE London and India Docks Company have lately completed very important alterations to the Poplar entrance of their West India Dock. The old entrance here, which was only 45 ft. wide, has been enlarged to 60 ft., and considerably increased in length. The two pair of wooden gates formerly used have been replaced by three pair of steel gates; these are worked by hydraulic power. At this entrance large pumping engines have been erected, so that the level of the water inside the dock can always be kept 18 in. above Trinity high water mark. The cuttings to the import and export docks have also been increased in width from 45 ft. to 60 ft., but no gates are now used at these places. The railway swing-bridges over these cuts had, of course, to be lengthened. A considerable time ago the London County Council let a contract for the renewal of the road-bridge over the Blackwall entrance, but at present there is practically nothing done towards its erection, and as the entrance is open for shipping, the entire vehicular traffic at this point is altogether stopped, which is a very serious matter. The swing-bridge now in course of construction is a large one, and many months must elapse before the traffic can be resumed.

A SHORT paper by Mr. R. R. Tatlock, F.I.C., issued from the Glasgow City Analyst's and Gas Examiner's Laboratory, combats the idea that a large percentage of fuel is lost in the smoke which issues so abundantly from our chimneys, and urges that statements as to the loss of heating power along with smoke have been greatly exaggerated. In some experiments which were made as to the composition of smoke in special cases, it was found that the smoke represented 51·46 grains of matter per every 100 cubic feet of furnace gases, and of this amount 20·65 grains consisted of incombustible mineral matter. Other experiments on the same lines gave much the same average results. In regard to the conclusions to be drawn from these, Mr. Tatlock says:—"To find how much carbonaceous matter was actually lost as smoke, it will be necessary to know the number of cubic feet of furnace gases given off by the combustion of, say, 1 ton of the dross. If the percentage of carbonic acid in the furnace gases is taken at 5 per cent., the total volume of these given off from 1 ton dross would be about 940,000 cubic feet, measured at the ordinary temperature and pressure, and this would contain 41 lbs. of carbonaceous matter, and 27 lbs. of mineral matter. This would represent 1·83 per cent. of the volatile matters (gas, tar, &c.) given in the analysis of the dross, and if from this is now calculated the heating power according to Playfair's formula, it will only come to 0·057. This figure, compared with the practical heating power (7·75) of the dross, goes to show that the solid combustible matter of the smoke can only account for the very small percentage of 0·74 of the total heating power which can be obtained from the coal." We may add that this result is in accordance with the opinion often expressed, and to which we have always adhered—that for practical purposes there is no such thing as "consuming your own smoke;" at all events, as Mr. Tatlock puts it, "there is little or no gain in burning smoke," and other methods of dealing with it ought to receive consideration.

AT Berlin, the pending opening of the New Imperial Houses of Parliament has occasioned some discussion as to the future arrangements of the König's Platz. The main front of the new block faces this historic square, in the centre of which stands the Column of Victory. Directly opposite, however, we unfortunately find a theatre of little architectural pretension, which contrasts oddly with its surroundings. It was for this site that the winners of the great National Monument competition had planned a Pantheon, which would have certainly been a far more imposing memorial to the late Emperor William than the nondescript equestrian statue now being erected in front of the "Schloss." It is, however, not unlikely that the nation, as such, will yet one day carry out this idea by voluntary subscription, if a fitting occasion arise, but until then Herr Wallot, the architect of the Parliament buildings, will probably have to content himself with some judiciously-arranged colonnades. These will enclose the approach to his building, and, as far as we can see from his plan, they should greatly improve its aspect.

IN our review (Nov. 3, 1888) of the late William Rendle's book upon the "Inns of Old Southwark and their Associations," illustrated by Mr. Philip Norman, F.S.A., we described the architectural features common to buildings of that class, distinguished by their "galleries" and "boxes"—names, by-the-bye, that have survived to the present time in our theatres, reminding us that dramatic performances were formerly held in inn courtyards. Recent changes in the Borough and other quarters of the town have left in London but very few examples with that particular constructive feature, and now one of them is about to disappear. The sale is announced of the "Old Catherine Wheel" in Bishopsgate-street Without, No. 40, which, standing back from the main thoroughfare, has commonly escaped notice: the total freehold area to be devoted to building purposes is about 11,200 ft. superficial. This inn, whose galleries on the

first and second floors had been latterly covered in with latticed windows, was damaged by fire in March, 1886, and is, we believe, the last house of its kind in Bishopsgate-street, which could boast of many a famous galleried inn in times not remote. We well remember, for instance, the "Four Swans," the "Green Dragon," and the "Flower Pot." The "White Hart," originally a hostelry that appertained to Simon Fitzmary's neighbouring priory, afterwards Bethlehem Hospital, was pulled down in 1829; it stood next north of St. Botolph's Church. The date "1480" was on its front, consisting of three bays reaching from the ground to the attic story, with lofty windows all along the first and second floors, somewhat like that of the "Half-Moon," which remained in Aldersgate-street until 1880. Pennant cites the "White Hart," but he says "none of the original building appears to be left." About twenty years ago they pulled down the "Four Swans" (belonging to Magdalen College, Oxford), where Sir Thomas More's retainers lodged when he occupied his mansion close by. On one occasion the landlord resisted a seven hours' siege by Ireton and a party of Roundheads when in pursuit of some messengers from Sir Edward Dering at Sittingbourne to Lord Goring's forces at Ingatestone, Essex. It was also in high favour with members of Cambridge University, and the chief posting-house to and from the eastern counties. Hobson, the Cambridge carrier, however, used to resort to the "Bull" in this same street.

AT the Church Congress to be held at Exeter next month, commencing on the 9th, we see that the subject of church architecture, or we suppose church decoration rather, is to be treated by Mr. W. B. Richmond, from whom the Congress are sure to have a paper worth listening to on the subject. If those who are concerned with the so-called Ecclesiastical Art Exhibition, which forms an annual feature in the Congress, would follow the same example, and go to architects and artists for drawings and designs for exhibition, and for work made from their designs, instead of going to church furniture shops, there would be some chance of the exhibition being worth seeing, which it scarcely ever is.

THE usual autumn sensation play at Drury-lane contains, among other things, it appears, a piece of brief but pithy architectural criticism. Some one refers to the Law Courts as a building which is "a cross between Westminster Abbey and the Underground Railway." Those who have tried to find their way about the interior of the building on business will best appreciate the point of the remark.

ARCHITECTURAL ASSOCIATION.

SUMMER VISIT TO KETTERING.

ON Saturday last, a party of members of the Architectural Association accepted the invitation of their past president, Mr. J. A. Gotch, and visited Kettering, where they were met by Mr. Gotch, and his partner Mr. Saunders. Piloted by these gentlemen, the party spent the morning in exploring Kettering and visiting several buildings recently erected from the designs of Messrs. Gotch & Saunders. The first halt was made at "Sunnylands," a new house on the outskirts of the town, in which the architects have seized the opportunity afforded by the apparent difficulty of the site being some 3 ft. below the road level to produce some charming effects. A raised terrace with arcaded balustrade and steps on each side to the garden leads from the roadway to the entrance porch, which projects from the main building, and has over it the landings of the principal stair. The exterior of the house is carried out in red Leicester sand-faced bricks with dressings of Weldon stone, the details being conceived in the spirit of that phase of English Renaissance with which Mr. Gotch's book has made the world familiar. Internally one of the most pleasing effects is that of the entrance hall, with its marble mosaic floor and the oak staircase. Considerable attention has been given by the architects to the arrangement of bays and alcoves, which add largely to the interest and piquancy of the interior, whilst plate glass and low window sills meet the requirements of modern householders, and at the same time are cleverly managed so as not to become bugbears to the designer. Indeed, one of the most striking characteristics of the domestic work of Messrs. Gotch & Saunders is the happy combination of modern ideas with the full spirit of old work which makes the productions of those gentlemen eminently liveable homes without sacrifice of æsthetic satisfaction.

Returning to the town, the party next made their way to the church, the exterior of which derives its chief interest from the fine western tower and spire. The church is of Late Perpendicular date, with a few earlier windows and doorways, which have probably been reused from a former edifice. The building has been recently restored by Sir Arthur Blomfield, and though large and spacious, contains few features of interest internally. The appearance of external treatment of plinths and buttresses on the eastern face of the tower, though now inside the church, is somewhat puzzling, and is open to various conjectural explanations. Some good carving is to be seen on the roof of the south chancel aisle, generally known as Sawyer's Chapel, and there are some remains of old wall paintings, including a figure of St. Roche and a few fragments of stained glass.

From this old parish church it was fitting that Mr. Gotch should conduct the visitors to his new mission church of St. Mary the Virgin, passing on the way the Sun Hotel, the exterior only of which was glanced at. This is simply and broadly treated, but is, nevertheless, full of piquancy from the curiously irregular line of the street frontage, the road winding with a double curve just at the point where the inn is situated.

The church of St. Mary the Virgin affords accommodation for about 500, the whole of whom are to be seated in the nave, the aisles being narrow and for passage only. A departure from precedent is seen in the treatment of the nave piers, which are of brick and plastered, a band of cast ornament forming the impost. The arches are low and segmental in form, thus leaving plenty of room for ample clearstory windows from which alone the nave is lighted, without any openings in the aisles. The chancel is 40 ft. long, and has its window at a considerable height from the floor, so that the whole church is lighted virtually from the clearstory level. The aisle-walls, following the *motif* of the nave-piers, are plastered, the remaining walls being faced with a warm-coloured iron-stone from Glendon, three miles north of Kettering, with Weldon stone for dressings. These materials are also used throughout for the external wall facings, and form a delightful combination with the Broseley tiles used on the roofs. The vestries have been treated in a somewhat domestic character, and, indeed, a flavour of domesticity runs through many of the details of the building, to the advantage of the homeliness desirable in a church intended primarily for the working population, in whose midst the building is located.

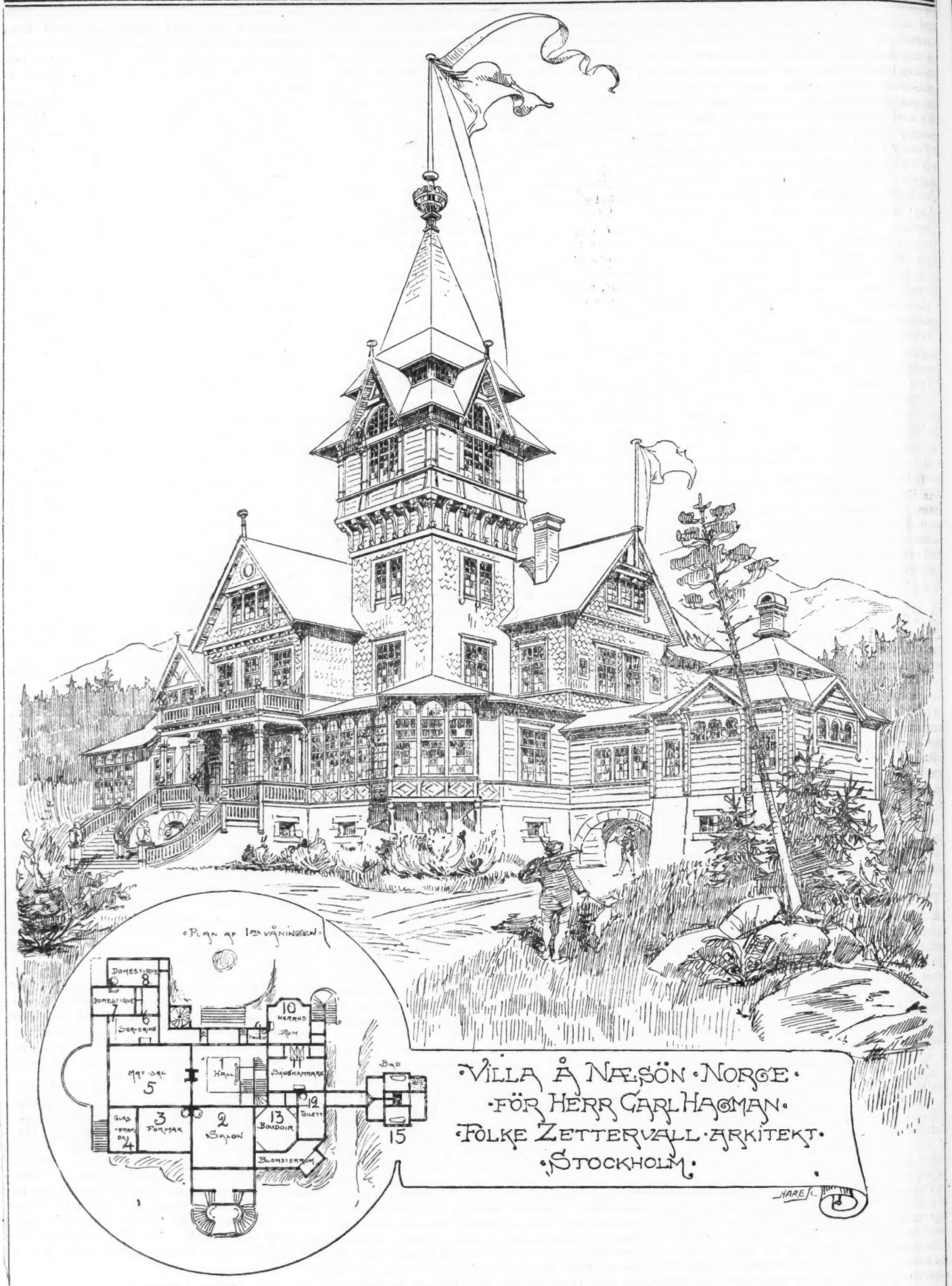
From the church the party returned through the town, halting at the Stamford-road Board Schools, a large and well-planned school for 1,000 children—boys, girls, and infants, on the central-hall system. The class-rooms of the mixed school are divided from the central hall by glazed screens; wood-block floors, and glazed brick dados are used throughout, and a proper cookery class-room is provided on the girl's side. The most prominent feature of the school is the system of ventilation by forced current on what is called the "plenum" method, a fan in the basement driving fresh air through ducts to pass over batteries of hot-water pipes and so into the lower part of the rooms; whilst the foul air makes its exit through open louvred turrets on the roofs. With the idea of obtaining the fresh air as pure as possible the intake is contrived at a high point in the clock-tower which forms the dominant feature of the external composition.

It being now near luncheon-time, the party turned their steps towards the Liberal Club, another of Mr. Gotch's works, rather earlier than those already seen, having been built in 1886, in which skilful treatment has been given by the designer to an irregular and awkward site A full inspection of the interior of the club, with its reading and smoking rooms, two billiard-rooms, assembly-rooms, dining-rooms, having been made, luncheon was then an agreeable interlude.

After luncheon, carriages were provided by Mr. Gotch, and the party drove northward from Kettering to Rushton Hall, seeing on their way, but without stopping, the new Wesleyan Chapel, erected from the designs of Messrs. Gotch & Saunders. Rushton Hall is one of those examples of the English Renaissance which the labours of Mr. Gotch have done so much to bring to the appreciation of architects and amateurs. Upon a foundation of fifteenth-century work, the great Northamptonshire building squire, Sir Thomas Tresham, added here much of his work, and after the misfortunes which came upon him by the participation of his son in the Gunpowder Plot, his successors in the property, the Cockaigns, made still further additions, bringing the house to its present form and attractiveness. Arranged around three sides of a quadrangle with a low screen corridor closing in the fourth side, and with its dormers of varied design, and its slight differences of detail, the house forms one of the most charming instances of Early English Renaissance to be found even in Northamptonshire. After duly admiring the exterior, and viewing the hall and the principal staircase, the only remaining parts of interest internally, the visitors proceeded to the famous triangular lodge, erected at one end of the park by Sir Thomas Tresham, where much time was spent in endeavouring to unravel the marvellously intricate web of symbolism which the designer has thrown over the whole building. Of the main idea, the form of the building and the superscription over the doorway, "Tres regnum ferant," give a sufficiently clear indication, but it is obvious that the imagery does not end with this, and it is not easy to explain even what is evidently here veiled in imagery and illustrated by symbol. The allusion even of the dates on the work is not readily explicable, but apparently those of 1593 and 1595 refer to the commencement and completion of the work. The return from the lodge was made by way of the delightful avenue of chestnuts, in which the poet Dryden is said to have walked and to have composed "The Hind and the Panther." Time did not permit of further explorations of the works of Sir Thomas Tresham, and the party drove back to Kettering, alighting on the West Hill, where Mr. Gotch has built for himself the first house on one of the best locations around Kettering, an example followed by his client, Mr. Thorpe, whose house, Elm Bank, was then inspected. Elm Bank is built on the brow of the West Hill and the sloping nature of the site has led to the adoption of some interesting features in the general disposition of terraces, steps and balustrades, a garden-house, and stables; whilst the house itself is very effective and very good value for the cost, less than 3,000*l*. One of the most pleasant features of the plan is the entrance hall arranged as a wide corridor from which the reception rooms open. Advantage is taken of the roof space to provide not only additional bedrooms but a large play-room which serves not only for the amusement of the children but also for that of their elders, being admirably arranged and suitable for private theatrical performances. As in most of Messrs. Gotch & Saunders' recent work the materials are red Leicester sanded bricks and Weldon stone dressings, with Broseley tiles for the roofs. Each of the principal rooms is ventilated by a separate upcast flue, the fresh air being admitted at ceiling level in the bays.

Crossing the road the party entered Mr. Gotch's garden and then the house, which that architect has built for himself, and here they were entertained by Mr. and Mrs. Gotch with tea. Mr. Gotch has selected an admirable position for his own house, the view of Kettering town with the church and its steeple being very charming. The house follows the lines of those previously seen in many respects, but is very quietly treated. Thus ended for the visitors a very enjoyable day, and they returned to town fully persuaded of the delights of a country practice—when it is a good one.

MIDLAND INSTITUTE, BIRMINGHAM. — The Archæological Section of this Institute made its concluding excursion of the season on Wednesday, the 12th, paying a visit to the neighbourhood of Harecastle and Congleton. They visited the well-known Moreton Old Hall, and from there went on to Astbury Church, which possesses a screen more than 400 years old, a font with a wooden Jacobean cover, and several monuments of great antiquity. On reaching Congleton, the party were met at the Town Hall by the Mayor and the Town Clerk, who allowed them the privilege of inspecting the valuable collection of ancient deeds, charters, and muniments belonging to the town, a description of which was given by the Town Clerk.



A Villa near Christiania.—Design selected in Competition.

REFERENCES:

1. Hall.
2. Drawing-room.
3. Ante-chamber.
4. Glass-covered Verandah.
5. Dining-room.
6. Service.
7 and 8. Servants.
9. Lavatory.
10. Proprietor's Private-room.
11. Principal Bedroom.
12. Dressing-room.
13. Boudoir.
14. Conservatory.
15. Bath-rooms.

PREMIATED DESIGN IN THE NÆSÖN VILLA COMPETITION, CHRISTIANIA.

WE referred the other day in our "Foreign" Notes to an architectural competition for a private villa for Herr Hagman, a professional singer, near Christiania. The competition was confined to Scandinavian architects, and appears to have excited keen emulation. The accompanying illustration is that of the premiated design, by Herr Zettervall, which will, we presume, be erected. It does not appear to English eyes a very remarkable result from a keenly-contested competition, but the illustration may be interesting as showing the present taste in villa architecture in Norway.

THE HYGIENIC CONGRESS AT BUDAPEST.

SECOND NOTICE.

THE interest of the discussions of the Congress of Hygiene and Demography was by no means exhausted at the conclusion of the earlier proceedings given in the last issue of the *Builder*. For the medical members of the Congress surprises followed each other rapidly from day to day, as the new experiments made in the three years' interval since the last Congress were developed by the keenest bacteriologists of Europe, in relation to the germic theory generally, and to the epidemics of diphtheria, cholera, and some of the tropical diseases in particular. The sections which most interest our readers were left very largely to the English and French representatives, to whom must be added a famous Viennese architect, Herr Ferdinand Fellner, and one or two Hungarian and Russian engineers. The Rev. C. G. K. Gillespie (certificated Sanitary Inspector) pleaded eloquently the claims of sanitary science on religious teachers in Section VI., and the teaching of sanitary science in schools was dealt with in papers by Dr. Anthony Roche, Professor of Hygiene in the Royal University of Ireland, and other members, but it was in Sections VIII., IX., and X., which usually sat together, that the papers with which we are most concerned were read.

Three German papers were read, with Dr. Karoly, the President of the section, in the chair, on "The Ventilation of Dwelling-houses," followed by an English paper, forwarded by Sir Douglas Galton, on "Heating from a Central Source," but read by Mr. John Slater in the author's absence, and one on a similar subject by M. Emile Trélat, Professor of the *Arts et Métiers*, Paris, read for the author by M. Masson. Mr. Arthur Cates, having now been invited to preside, the two latter papers were read in succession, and were subsequently discussed together.

Sir Douglas Galton's paper, the full title of which was "Central Heating of Residences for Lodgings and Whole Towns," was as follows:—

"The heating of towns must necessarily depend upon the best methods of supplying heat to each dwelling in a group. When this has been determined it may be more convenient to supply groups of dwellings more or less numerous from one source of heat. This might almost certainly be the case with several separate dwellings were they all in one building, as is the case with flats. But the heating, on a combined system, of separate houses is an extension which has been put into practice only in the United States of North America. The first point for consideration is, what is wanted in the heating of a house? This question may be considered primarily under the head of what is the form of heat which is most comfortable, and, in the next place, what is the most economical. There is no question but that comfort in heat depends on radiation. We are practically furnaces in which heat is being constantly generated. This heat is radiated away from us more or less rapidly in proportion to the temperature of our surroundings. When we are in proximity to a very cold body, as, for instance, in the crevasse of a glacier, this heat is given off more rapidly than we can produce it, and we are frozen When we are in a place where the surrounding objects possess a temperature approaching that of our bodies, which is 98 deg. Fahrenheit, or 36·66 centigrade, we cannot part with our heat with sufficient rapidity, and we die. Comfort lies between these extremes. The simplest method of procuring warmth has always been by means of the open fire. That method warms directly by radiant heat. Before proceeding further it is desirable to have clearly before us the different ways in which heat is applied, as these differences have a very important bearing on comfort in warming. Heat is transferred from the incandescent fuel to the bodies which it warms by conduction, assisted in some way by convection or by radiation. *Conduction* is the transference of heat from one body to another by means of some tangible medium which fills the whole space between the two bodies. For instance, if a poker be held with the other end in the fire, the heat from the fire is transferred along the poker to the hand by conduction. *Convection* is the transference of heat from one place to another by the bodily moving of the heated substances. The warming of a building by hot-air pipes is an illustration of transference of heat both by conduction and convection. The heat from the fire is in the first place communicated by conduction through the plates of the fire-box from the incandescent fuel to the water in the boiler. It is transferred by convection along the pipes which convey the water to different parts of a building as the hot water circulates. It is again transferred by conduction to the air close to the pipes. This air being expanded ascends and carries the heat with it by convection to different parts of the room. *Radiation* is a form of the transference of heat which is not either conduction or convection, by ordinary matter; that is to say, heat which is transmitted in a manner of which all we know is that it is not convection nor conduction as generally understood, is called radiant heat. Radiant heat warms, to a greater or lesser degree, the solid bodies upon which the rays impinge, but practically passes through the air without warming it. The amount of heat radiated from a body at a given temperature depends on the physical nature of the surface of the body. The hotter the body in proportion to an adjacent body, the greater, proportionally, will be the rapidity with which it emits radiant heat, and the emission of it will be greater in direct proportion to the difference of temperature between the two bodies. In the presence of a cold body an adjacent warm one will rapidly lose heat. If a person in a warm condition sits near a cold wall the radiation from the person's body to the cold wall will cause the sensation of a draught. This is easily tested by hanging a piece of carpet on the wall so as to intercept the radiation, when the feeling of draught will cease.

All these considerations have an important bearing on the application of heat to occupied rooms. Warming and heating in our houses has usually been effected by one of the following methods:—I. The open fireplace in each room; II. Warmed air brought into corridors or rooms by flues from a centrally-placed calorifier or heating apparatus; III. Close stoves placed in the room or place to be warmed; or else hot-water pipes or steam-pipes heated by a boiler in some central position, often at a considerable distance, and carried by the pipes thence to the places where the heat is wanted. Or, again, heat may be supplied by electricity conveyed along wires from a central station. The heat conditions which prevail between the air and the walls or objects in a room are different in each of these cases.

1st. The open fire warms chiefly by means of radiant heat. Therefore, with the simple open fire the grate selected should, in the first place, be one which contributes radiant heat most effectively. Radiant heat much depends upon a fire with flame. The material used for the sides and back which are in contact with the incandescent fuel should not absorb, but should reflect heat. The height of the grate above the floor should be considerable, because the fire when raised throws its rays upon the floor at a better angle for warming it than when the grate is very low or on the ground. So far as radiant heat alone is concerned it is difficult to improve upon the simple Rumford grate with splayed fire-brick at the back, arranged to lean slightly forwards over the fire; whilst, in order to favour the draught, some air should be admitted through the bottom of the grate, and the front bars should be vertical to prevent accumulation of ashes upon them. In all open fireplaces with a good draught a considerable portion of heat is evolved beyond that utilised for warming the room, and even beyond what is necessary for purposes of ventilation. This may be used to warm inflowing air. The ventilating fireplace called the Galton Grate was designed for the War Office with this object. Fresh air is admitted to a chamber formed at the back of the grate, where it is moderately warmed by a large heating surface, and then carried by a flue, adjacent to the chamber flue, to the upper part of the room, where it flows into the currents, which already exist in the room, and with this form of grate and its ventilation, the temperature of a room has been found not to vary in any part to a greater extent than 1 deg. Fahr., or at most 2 deg. General Morin's experiments showed that the proportion of heat utilised in the room by the use of warmed air in this grate was three times as much as that utilised by an ordinary grate.

The main principle of the open fireplace is that it warms by radiant heat. It leaves the air cool to breathe, but it warms the furniture and the walls, and thus prevents these from unduly abstracting heat from the body. The ordinary open fire requires fuel to be continuously supplied in the room by manual labour, and the rooms heated by this means are entirely self-dependent. On the other hand, a gas fire also furnishes radiant heat. It is supplied with fuel brought from a central source of supply, but the products of combustion from a gas fire are comparatively cool, and do not produce the same velocity in the chimney which a coal fire produces; and, instead of favouring ventilation, it tends to cause the dispersion of those products in the room.

Warming by Heated Air.—When hot air is conveyed into a room by flues from a stove or other central source of heat in the basement, it is necessarily warmer than the walls, consequently the walls and furniture of the room are warmed by means of the heat conveyed to them by the heated air, and are thus necessarily cooler than the air itself. The warmed air is less pleasant and invigorating to breathe than cold air. If you take two equal volumes of air, one heated and the other cold, the expanded heated air will contain less oxygen per volume than cold air. For instance, at a temperature of 32 deg. a cubic foot of air weighs 567 grains, which would be distributed in the proportion of 448·8 grains of nitrogen to 118·2 grains of oxygen, whilst at a temperature of 80 deg. the cubic foot of air weighs 516 grains, which would be distributed in the proportion of 408·4 nitrogen, to 107·6 of oxygen. It is probably for this reason that the air of a frosty morning is so invigorating.

The method of warming the walls by means of heated air necessarily leaves the walls colder than the air of the room, and the heat of the body is radiated to the colder walls. Hence, if the walls are to be warmed by the air admitted to the room, the temperature of the warmed air must be raised beyond what is either comfortable or healthy for breathing, and thus if you obtain your heat by warmed air alone admitted direct to the room, discomfort in one form or the other can with difficulty be avoided. A little consideration shows that so far as warming by hot air is concerned it is only in single houses, or public hotels which are compact in their arrangement, that hot air warmed at a central source of supply could be distributed for warming purposes with any regard to economy. In scattered buildings the hot air would lose too large a proportion of its heat in the flues and passages carrying it to its destination. The American Smeed hot-air stove is probably the best arrangement for the direct warming of air where hot water or steam is not resorted to.

Warming by Close Stoves, or Hot-water or Steam-pipes, or Electricity. — These methods require separate arrangements for ventilation. Stoves may be of fire-clay or of iron. The fuel may be coal, charcoal, or gas. These would probably be supplied in the room itself. If gas be used as the fuel, then it would be brought in pipes, and would be turned off or on as required in the room. Electricity, as a mode of warming, would similarly be brought from outside. The nature of the material of which the stove is made, and the nature of the fuel, influence the condition under which it distributes heat. A fire-clay stove warms the air slowly. It would not supply radiant heat, but it does not allow of the permeation of impure gases from the fuel. Iron stoves, if heated to a high temperature, would give out a certain proportion of radiant heat, but might allow of the permeation of carbonic oxide through the metal into the air to be warmed. Gas-stoves are convenient in that the fuel is supplied without trouble. But the low temperature of the gases in the chimney favours the occurrence of back draughts. Hot-water-pipes, steam-pipes, and electricity, as at present applied, do not present these inconveniences. There are, however, certain general conditions which affect hot-water and steam-pipes which have an importance for certain uses. The ratio of the emission of heat increases with the temperature. That is to say, pipes heated by hot water under high-pressure convey heat to the air with greater rapidity than pipes heated by hot water at low-pressure, and steam-pipes are more effective than hot-water-pipes, and steam at a high-pressure is more effective than low-pressure steam.

But there is another consideration. Pipes at a low temperature give out their heat to warm the air, but they give out very little radiant heat to warm the walls. On the other hand, pipes at a high temperature, like high-pressure hot-water-pipes and steam-pipes, give out a considerable amount of radiant heat to warm the walls as well as direct heat to warm the air in contact with them. Therefore, high-pressure hot-water-pipes and the steam-pipes present, though in a less degree, the advantages of the open fire, in that they partially warm the walls and furniture of a room as well as warm the air. Plates of iron or copper placed in rooms and warmed by electricity would present the same conditions of warming as hot-water or steam-pipes, according to the temperature of the plates. It is apparent that it is only with the assistance of either gas in the fire-

places or stoves, or of hot-water or steam-pipes, or of electricity, that a combined system of heating many houses from one central source can be arranged, or has been attempted. In the United States the earliest efforts were made to obtain a combined system of heating by steam for towns and villages by Mr. Holly. The broad principle which the Holly Steam Combination Company enunciated is that of furnishing heat from a central source of supply applicable to all domestic purposes, just as gas and water are supplied. The boilers are placed in a convenient central situation. From the boiler the steam passes into the main pipes, and lateral or branch pipes. The maximum steam pressure was about 100 lbs. per square inch. Since, in the conveyance of steam for a long distance, it is essential to guard against condensation or loss, great pains are necessary to cover the steam-pipes with non-conducting material. In order to effect this, the pipe is wound about first with asbestos, followed by hair felting, porous paper, manilla paper, finally thin strips of wood laid on lengthwise, and the whole fastened together by a copper wire, wound spirally over all. This is thrust into a wooden log bored to leave an intervening air-chamber between the pipe and the wood, and of sufficient size to leave from 3 in. to 5 in. of wood covering. By this means it is alleged that the loss of heat is little over 2½ per cent. Careful arrangements have to be made for admitting the steam into the houses, both to prevent loss and to ensure measuring it. It is not intended in this paper to go fully into the engineering details of this method. They can be obtained from the engineers who have constructed works in the United States. The system is especially applicable to countries where the winters are uniformly and persistently cold. In England the variations of temperature are so frequent and rapid, that whilst much heat is required at one part of the day, at another time this is not the case, consequently the frequent changes would make it difficult to provide economically for heating over a large area. The economy of steam heating depends on using low pressure steam and letting the water of condensation flow continuously back to the boilers, so that there should be no waste. This ought to be the arrangement in all isolated houses, hospitals, &c., but it is an arrangement which is not practicable where steam is distributed over large areas. The great advantage of furnishing heat from a central source of supply applicable to all domestic purposes, just as we get our gas and water, is, that it saves the annoyance of handling coal-ashes, kindling, &c.; also the expense of stoves and repairs. In the United States the charge adopted by some of the steam companies for steam was eight shillings per thousand cubic feet of air space per annum. Under this lump sum system a house of 60,000 cubic feet contents, which is about the capacity of a fair class London house, would pay about 24*l.* a year for heat, whilst an artisan in a model dwelling, which occupies probably from 6,000 to 8,000 cubic feet, would pay from 2*l.* 4s. 0d. to 3*l.* 4s. 0d. for heat a year, equivalent to from 10d. to 1s. 3d. a week. This is in the United States, where the winters are intensely cold, and where a very considerable amount of heat is necessary during the whole winter. On the other hand, by the introduction of meters made to register so as to pay for the steam actually used instead of by the cubic space, individuals might effect a reduction of cost by cutting off the steam from the radiators in unoccupied rooms. On a review of the whole question, it is evident that much advantage to the population in a town would result from a central source of heat, without the inconvenience of having to carry fuel to every house. In a moderate-sized house the annual consumption of coal will not be less than 20 tons. These are stowed away in cellars, and then raised thence in scuttles which hold about 28 lb. each—that is to say, at least 2,000 separate coalscuttlefuls have to be taken to various parts of the house, the ashes brought down again, and much labour devoted to removing the dust with which an open fire covers the furniture. Hence the complete use of steam would enable probably one female servant to be dispensed with. In artisans' houses the saving of trouble by having no fires to attend to, no grates to clean, and no coals to carry, would be of much value. In addition to this, each fire deposits much soot in the chimney, which at regular intervals is pushed up into the air by the chimney-sweep, and thus distributed through the neighbourhood, rendering continued cleaning necessary and compelling a large annual outlay in repainting and re-decorating. There is also a great inconvenience to street traffic caused by distributing coals to every house in every street. It is not, however, certain that steam would supply the most convenient form of heat. There is no doubt that with heating as with lighting, electricity would furnish the most manageable and the most hygienic form of heating. But it would be very expensive. Hence it is probable that eventually, rather than adopt a system of steam-heating, it might be found more simple and economical to supply a cheap form of gas for all of what may be termed the rough part of heating, including cooking; whilst the more delicate final touches in heating for high-class houses could be supplied by electricity."

The paper of M. Émile Trélat treated the theoretical part of the subject in terms almost identical with those of Sir Douglas Galton. M. Trélat drew the conclusion that there are only two modes of establishing in dwellings hygienic conditions of heating. Whether for hotels or private houses the true solution of the problem depended upon the maintenance in the walls of our houses of such a degree of heat as will ensure that the physiological temperature of the occupants will not be disturbed. In the practical application of the theory, Professor Trélat divides dwellings into two classes (*a*) those which, like schools, are occasionally unoccupied, where the heating apparatus may be employed during the intervals of vacancy, and (*b*) those, which, like hospitals, are permanently occupied, where the heat must be distributed by radiation. In the latter case stoves with large radiating surfaces should be employed, or the heat must be circulated by means of pipes conveying hot air or water. The solution of the problem of heating dwellings had absolutely no connexion with that of their ventilation.* In concluding his paper, M. Trélat passed a warm eulogium upon the English open hearths—"Those open fireplaces which cast through the dwelling the bright perspective of brilliant combustion, and afford the delightful convenience of immediately warming one or more of the members of the body on getting home on a cold night."

Professor Banister Fletcher, who opened the discussion, said that Sir Douglas Galton appeared to be of opinion that gas would continue to be the heating and cooking power of the future, and that while electricity might be an elegant luxury, its great cost would prevent its general employment, except among the rich. The remarkable and successful experiment recently carried out in the City of London before the Lord Mayor and a large company, in cooking a dinner by electricity, scarcely seemed to have received adequate appreciation, and the paper also ignored the demonstrations which had recently taken place at King's College, in the economical application of electricity to cooking and other domestic purposes. Of course, it was a matter of common knowledge that by using a thick wire electricity was obtained with great heating but little lighting power, while with a thin wire much light but little heat was given out. But the fact appeared to have been overlooked in the paper. A loss of 2½ per cent. of the steam used for heating purposes in the American apparatus described had been mentioned, but the paper did not say how far the steam had to travel. The cost of steam-heating for a cottage on the principle described was set down at from 10d. to 15d. per week, but if steam could not be supplied at a more moderate rate than that, the working-men in England would not be easily persuaded to adopt that method, whatever might be the practice in America.

Professor Corfield said the principle seemed at least practicable, and he thought it the correct one. Heating should be done by means of radiant heat, and not by means of air previously warmed. If air was previously warmed it would lose a portion of its oxygen, and if we got air short of oxygen we had to breathe a greater number of times to supply the required amount, and that meant more effort. Premises should not be previously warmed.

Mr. Blashill (London) was satisfied that the breathing of warmed air was not refreshing. Some means must be found to make the air warm in very cold winters. In the climate of that country (Hungary) the gas-stove was as much a necessity as the open fireplace in England. He had seen at Hildesheim in Germany a combination stove, well calculated to supply both *desiderata*, and it was the best kind of stove he had seen for warming buildings in a very cold atmosphere.

The Chairman (Mr. Cates), after a brief criticism from Herr F. Siemens (Dresden), who subsequently read a paper on "Heating by Gas," and remarks by one or two other speakers, wound up the debate. He said the discussion had been of great interest, and was well worthy of the most careful consideration. A point not mentioned he hoped would not be lost sight of—the means of warming in staircases. They ought to guard against the loss caused by letting the air cool during the night, which necessitated a great extra expense for re-heating in the morning. That was avoided in Germany by the use of the stove, as pointed out by Mr. Blashill. The admission made by M. Emile Trélat, who referred to the cheerfulness of the English open fire-grate, was significant, and if they could succeed in combining the cheerfulness of the open fire with the economy of the close stove, as used in North Germany, they would have solved an important problem.

The presidency having been transferred to Herr Steindl, architect of the new Houses of Parliament of Budapest, recently illustrated in the *Builder*, several German and Hungarian papers were read on heating by gas and electricity.

In other sections papers were read on the Shone system of sewerage, as carried out at Arad, in Hungary, by Mr. Parecz, Municipal Engineer of Arad; by M. Sijmons, C.E., of Rotterdam, on the "Liernur System of Sewage Treatment, as Carried out at Amsterdam"; by Dr. J. C. Thresh, Medical Officer of Health to the Essex County Council, on the "Hygiene of Drinking-Water"; by Mr. H. Robinson, C.E., on "Sewage and Water Purification by Filtration"; and by Dr. F. Stevens, D.P.H. (Camberwell), on "Men Employed in Sewers," the author taking a favourable view of the hygienic conditions under which such men carry on their occupations.

At the third sitting of the united sections dealing with the Hygiene of Public Buildings and Dwellings among the most important papers read were those of Mr. Th. W. Aldwinkle, F.R.I.B.A., on the "Planning of Fever Hospitals" and of Herr Ferdinand Fellner, architect, of Vienna, on the "Protection of Theatres from Fire;" Mr. Thos. Blashill, L. C. C., being unanimously voted to the presidential chair.

The Planning of Fever Hospitals.—Mr. Aldwinckle's paper was practically a description of the new Fever Hospital at Shooters' Hill, now in course of erection from the author's designs for the Metropolitan Asylums Board, of which the following are the leading points:—

The Asylums Board having found themselves, during the scarlet fever epidemic in London of 1892-3, in a serious deficiency as regards fever hospital accommodation, decided (after erecting two temporary hospitals) to erect three permanent fever hospitals, each for 500 beds, and the first one to be commenced was the Brook Hospital, the drawings for which were laid by Mr. Aldwinckle before the Congress. Before issuing their instructions for the preparation of plans, a specially-appointed Committee of the Asylums Board made a most exhaustive inquiry, extending over several months, as to the necessary requirements for a large fever hospital, and visited all the important and modern institutions of a similar character, with the result that the instructions issued to the architect were of the most complete and comprehensive character, and having been printed, formed, in the opinion of the author, the most complete and advanced text-book in existence on the subject of the requirements of a fever hospital. The Brook Hospital site is one which fulfils nearly all the requirements of an ideal hospital site. Placed at a level of over 200 ft. above the sea, and facing northwards towards Shooter's Hill-road, the land falls rapidly towards the south, so that the building can be arranged in terraces facing the south, so as to be shielded from the north and east winds. The main principles on which the hospital is designed are:—

Separate entrances for infected and non-infected business.

The separation of the staff quarters from infected buildings.

The complete separation of diseases.

The isolation of alien diseases.

The provision of abundant light and air to all buildings.

The following is a general description of the plan. In the front portion of the site are placed the several administration buildings, such as the official block, the kitchen and stores, the matron's office and needle-room, the doctor's residence, and three homes, respectively for the nurses, female servants, and male servants. The main portion of the hospital proper, or the infected building, stands to the rear of the

* It is needless to say that we decline to accept M. Trélat's dictum on this point.—ED.

administration building, and well separated therefrom, and consists of eight two-storied pavilions for scarlet fever, four similar but shorter portions for diphtheria and enteric fever, and six one-storied pavilions for isolation wards. These pavilions are connected with each other and with the administration building by means of covered ways, having open sides. There are two entrances to the hospital from Shooters' Hill-road, both being controlled from one porter's lodge. The "infected entrance" leads to the receiving wards, main pavilions, and laundry; and the "non-infected entrance" leads to the official block, store-yard, and staff quarters. By this arrangement persons from the outside, having business with the hospital, are not in any way brought into communication with infected buildings. This is particularly the case with the store-yard, which is immediately opposite to the "non-infected entrance."

The several homes for the staff have been arranged upon the principle that each home should have the *resident supervision* of the superior officer immediately responsible for its discipline. Thus the matron will reside in the Nurses' Home, the housekeeper in the Female Servant's Home, and the Steward's House will adjoin the Men-servants' Home. The nurses' home (for 194 nurses) is arranged as three separate blocks (one for night nurses only), and the mess rooms and sitting and recreation rooms are of one story only, with open roofs. All the main corridors of this home have large bay windows in the centre of one side, for light and ventilation.

There are eight main pavilions for scarlet fever, all of the same type. Each pavilion consists of two floors, the ground floor being on an average 6 ft. above the ground. The staircase communicating with the upper floor is entirely cut off from any connexion with the lower floor. Each main ward contains twenty beds, and each bed has a lineal wall space of 12 ft., a floor area of 156 ft., and a cubic space of 2,028 ft. There is also on each floor a separation ward for two beds. This ward is for patients of the same class of disease, but who require special treatment or attention. Each separation ward has its own water-closet with intervening lobby with cross ventilation. The duty-room or ward-scullery is so placed that it directly overlooks both the main and separation wards. The bath-room and lavatory are at the corridor end of the ward. The turret or annexe for water-closets, &c., is in the centre of the east side of the main ward with an intervening lobby with cross ventilation. It will contain two water-closets, a slop-sink, and a scalding-sink for bed-pans. All these will be of the "Bracket" type, so as to leave the floor clear for washing down. These floors, as well as those in the bath-rooms and lavatories, will be laid with a fall towards a glazed channel discharging into an external waste-pipe, so that the floor can be cleansed daily with the hose-pipe. The administrative corridor of a ward pavilion is important, as much business is transacted therein. This corridor is well lighted by a bay window 12 ft. wide. Leading from this corridor are a linen store, and a larder having a north light.

The warming and ventilation of these wards must be considered together. The wards will be warmed partly by open ventilating fireplaces, and partly by a low pressure hot-water apparatus, with copper radiator under the windows, enclosed in cast-iron cases with brass lid and wire gratings. These cases communicate through the wall with the external air, which is warmed by impinging upon the copper coils and then enters the ward. The inlet ventilation of the wards is by the following means:—By windows on both sides, having hopper sashes close to ceiling-level; by the ventilating stoves and radiator cases above described; and by galvanised-iron hit-and-miss ventilators placed in the external walls at the floor-level. The exhaust ventilation is thus effected:—By the open windows above described; by the open fireplaces; and by vertical shafts, lined with glazed bricks, and terminating about 10 ft. above the roof, in which an upward current is caused by steam copper coils.

The wards for diphtheria and enteric fever will be of similar arrangement, but the main wards, 90 ft. long, will contain only twelve beds, and each bed will have a lineal wall-space of 15 ft., a floor area of 195 ft., and a cubic space of 2,535 ft. These large areas, which greatly add to the cost of the hospital, were only decided upon in deference to the unanimous opinions of medical experts. The floors of all wards will be of wax-polished Indian teak. The walls will be finished with Keene's cement worked to a polished surface; and all internal angles, both vertical and horizontal, will be rounded. The laundry is placed to the west of the site, and will consist of two separate and distinct laundries, one for patients and one for the staff. Attached will also be the disinfector and destructor. The hospital will be lighted throughout with electric light.

Attached to the hospital, but under separate management, will be an ambulance station. This will comprise stabling for twenty horses, sheds for eighteen ambulance, mess-room and cubicles for twenty-four male servants and eight female servants, a complete home for eight small-pox nurses, a complete laundry, and a residence for the superintendent. The cost of the hospital and ambulance station, including land, when completed and furnished will be about 250,000*l.*

In the discussion which followed the reading of the paper, Mr. M. W. Ackworth (Metropolitan Asylums Board), Mr. Councillor Dick and Mr. Councillor Macfarlane (Glasgow), Mr. Pollard (Edinburgh), Professor Smith (King's College), Professor Banister Fletcher (City of London), and one or two foreign members took part in the discussion.

Mr. Ackworth criticised the design on economical grounds. He thought the interests of the ratepayers had been entirely left out of sight, the cost of 500*l.* per bed being unprecedentedly extravagant.

Mr. Dick expressed similar views, and objected to two entrances as an element of danger.

Mr. Pollard adduced a fact with regard to Edinburgh which, in his opinion, thoroughly justified a liberal expenditure of money, even when raised by the rates, where the expenditure was wisely directed, and an adequate object was sought to be obtained. In Edinburgh 2,000,000*l.* had been spent in the last few years in schemes of improvement, but as a result of those improvements the rateable value of property had been augmented to the extent of no less than 4,000,000*l.*

Mr. Macfarlane said London was a large city, and ought to have the best hospital that could possibly be built. As a representative of Glasgow, he would accept with pleasure such an hospital.

Professor Roger Smith said this very question of cost had received the greatest consideration. At first plans had been prepared showing a considerably less cost per bed, but they were referred back, and the plans finally approved involved an increased cost estimated at some thousands of pounds. The cost might have been lessened by omitting the ambulance station from the design, but the hospital being away at the south-east corner of London, it was thought better to take advantage of the building of the hospital to provide the district with a much-wanted ambulance station. Mr. Councillor Dick had objected to the two entrances, but the porter's lodge was situated between them, and no one could go in without being seen.

Professor Banister Fletcher thought the discussion should be based on the fact that this was an experimental hospital, in which the chief object was to obtain the best plan of the best hospital that could be erected. In such an experiment the question of cost was not a paramount consideration. It would often happen that where a building was properly planned, the cost of maintenance and management would be reduced in consequence. The first necessity was to obtain such a plan that disease could be best combatted and thus the term of occupancy by the patient be reduced. This would in itself be a saving to the ratepayer. The ratio that rates and taxes bore to rent in England was lower than in continental countries. He had been informed that in Vienna, for instance, the rates were as high as 40 per cent. of the rent or the rateable value.

Mr. Pollard (Town Councillor, Edinburg), then read a paper forwarded by Mr. Campbell Douglas (Glasgow), on the same subject. The planning of a fever hospital involved so many special considerations, that the skill of the best architects was severely taxed. The general principles as to the selection of aspects, convenience of management, complete separation of the wards from the administrative departments and the staff, were common to all such buildings, but there was plenty of scope for great diversity in architectural details. It was not necessary that a fever hospital should be far removed from centres of population. The small-pox hospital of Edinburgh, which was situated in the Canongate, was not found to be an evil, notwithstanding the evidence on the other side in the case of Sheffield. In the paper, particulars were given of the small-pox hospital on the banks of the Clyde at Glasgow, which contained, in 13 pavilions, 390 beds (30 in each), a remarkable thing about which was that in the more modern one-story hospital at Glasgow the death-rate was 10 per cent., while in the old three-story building in the Canongate at Edinburgh the death-rate was only 6 per cent. Hospital accommodation ought to be provided in proportion to, at least, 1 per 1,000 of the population, but 1½ per 1,000 was better. He recommended for hospitals an American portable bath, formed of "Fibrine," a sort of *papier maché*.

Mr. Blashill, having briefly wound up this portion of the discussion, vacated the chair in favour of the local president.

(To be concluded in our next issue.)

Illustrations.

STUDY FOR REREDOS FOR HOLY TRINITY CHURCH, CHELSEA.

THE drawing now illustrated is one of a series of studies made for the proposed new reredos in Mr. Sedding's church of the Holy Trinity, Sloane-square. It was not intended to be in any way final, but to be used as a suggestion, a guide to future efforts. It embodies the results of many elevations done to scale, and was sketched in perspective as it would probably appear in relation to the surrounding architecture. No attempt was made to give atmospheric effect, which would have been entirely out of place, the object being to get a harmonious arrangement of masses, to realise relations, to produce a pattern of varying forms in various positions, to make a mosaic by mingling masses of material; it was an effort, in fine, towards what my friend Mr. J. Attwood Slater happily called the "Interference of forms," "the nearest approach in form to iridescence in colour." This latter would of itself give reason for, and justification of my intention to put a high reredos in front of the east window, instead of weakly subordinating it, as many critics desire.

It has long been a commonplace in the design of interiors that the interest of the spectator should be excited, and his attention compelled to some object of interest, before passing to the real end and termination of the building. The bounds and limitations of the view should be rather suggested than brutally defined, gently led up to than abruptly declared.

By these means only can mystery be obtained, the spirit of the spectator kept on the alert, and that most delightful of all sensations, the expectation of surprise, awakened and gratified.

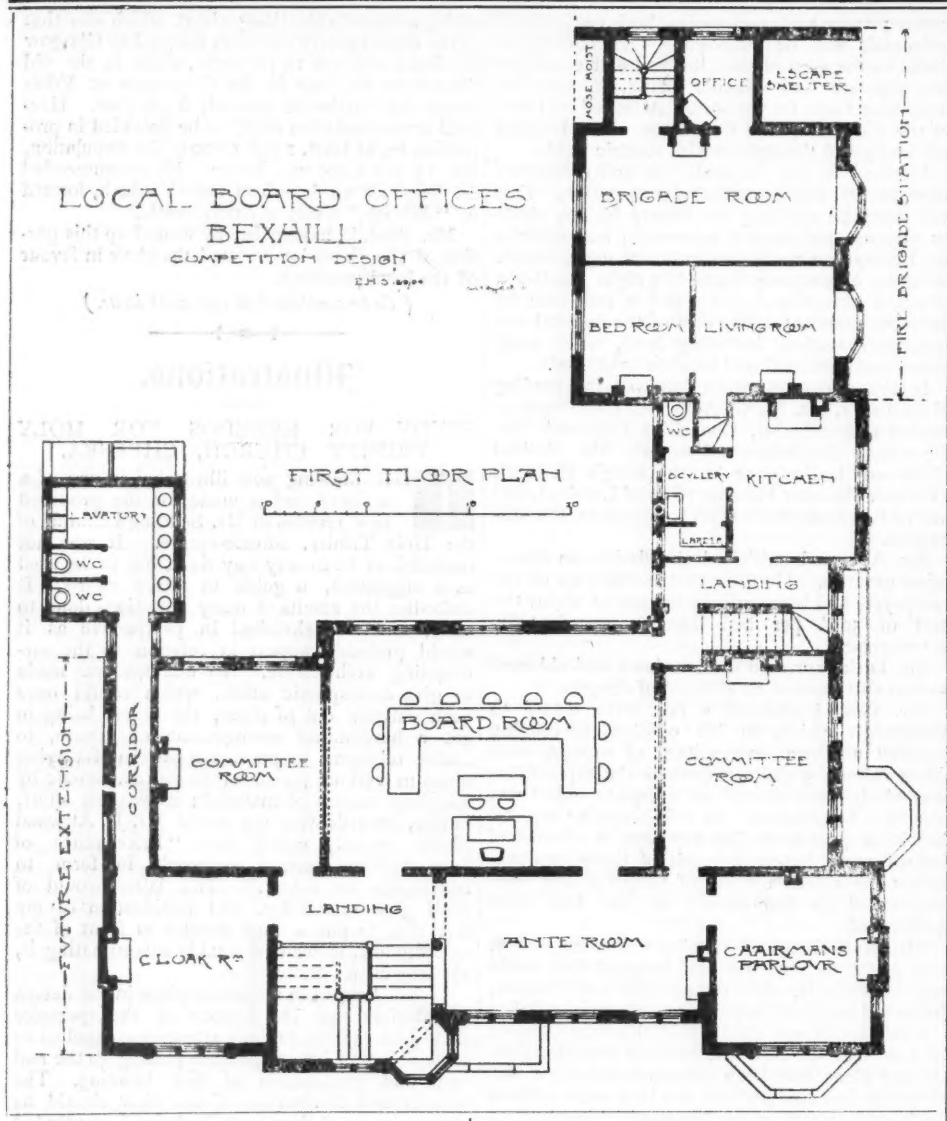
More than this, to say, as many do, that because a certain window has been designed, nothing should be placed in front of it, is to assume that the building was made for the window, and not the window for the building. It is to forget that in the Christian Church the altar and its surroundings form the central feature, the reason of the building's being, and that, though the eastern wall be built of precious stones, and the window glazed with gems and jewels, yet reredos and tabernacle tower over all.

H. WILSON.

*** We are not quite sure whether we, who were among the "critics" referred to, are quite converted; we still have an impression that a very large and elaborate traceried cast window is meant to be seen from the church. But we are quite sure that many of our readers will enjoy Mr. Wilson's characteristic defence of his position as much as we do.—ED.

COMPETITION DESIGN FOR DARLINGTON MUNICIPAL BUILDINGS.

WE are unfortunately unable to give the plans which would have explained this elevation, for the reasons referred to in our "Note" on page 150 *ante*—viz., that all the writing in the plans sent to us would have become illegible on reduction of the plan to the necessary size for our page, and it would therefore have been unintelligible. The elevation, which was exhibited at the last Royal Academy Exhibition, shows the side view of the design, which was submitted in competition by the author, Mr. T. F. Pennington. The left-hand portion of the elevation shows the flank of the large hall for public meetings, and the right-hand portion the municipal offices, divided on the ground floor by a transverse corridor with entrances at each end, one of which is shown in the elevation. The Mayor's suite of rooms are at the right-hand of the block, the large window at the extreme right of the elevation being that of the committee-room which forms part of the suite. In the



public hall portion of the elevation, the long low windows beneath the principal ones serve to light some seats which are rather ingeniously contrived in the bays. The single windows below light an emergency corridor for exit.

The plan was arranged so that the public hall could, if desired, be used in connexion with the Mayor's reception rooms; and, at the same time, it could be entirely cut off from the municipal buildings, if in use in the daytime, by the locking of the doors of inter-communication.

"SUMMER COTTAGE" FOR THE ISLE OF WIGHT.

THIS house was designed to meet the requirements of a family needing a seaside residence, containing only one large living-room, about 30 ft. by 18 ft., a good hall, which could also be used as a sitting-room, and several bedrooms and the usual offices. A large balcony for meals in Continental fashion, and a verandah or "stoop" below, were also provided.

The building was to be principally of concrete, formed of shingle from the beach, the face of the lower portion finished yellow roughcast, the upper walls having bands of grey brickwork, the decoration round the doorhead being in sgraffito. The roofing was to be of grey slates, and the whole of the woodwork painted white.

VICTOR T. JONES.

COMPETITION DESIGN FOR LOCAL BOARD OFFICES, BEXHILL.

THIS drawing was prepared for the Royal Academy Exhibition, from a design submitted in competition for the Local Board Offices, Bexhill. Red brick, Bath-stone, and tiles, with creosoted timber in the gables, were the materials proposed for the execution of the work.

The original drawings formed one of the three sets placed by the board. A plan of one floor is appended.

CONSERVATIVE CLUB, GLASGOW.

THIS is a reproduction of a perspective drawing of this building, which was exhibited in the Royal Academy this year. We regret that we are unable to give any plan or description of it owing to the absence from town of the architect, Col. Edis, of which we were not informed until it was too late to make any change in the publication.

Correspondence.

To the Editor of THE BUILDER.

"PICTORIAL ARCHITECTURE."

SIR,—I have noticed in your journal of September 15 a letter signed "Student," referring to my picture, "The Trial of Joan of Arc," with Editor's footnote. May I state in reply that though the effect and lighting of the background were studied in St. Bartholomew's Church, an inspection will show that the architectural details are in many ways distinctly not the same, excepting the Norman work, which is identical with that in France.

The alterations I made in the Gothic some were based upon examples given in M. Viollet-le-Duc's "Dictionnaire Raissoné," such as the flamboyant panels in the recess, which in no way resemble English architecture. I should mention that the Chapel of Rouen Castle, in which the trial took place, has long since been destroyed.

The indifference to details mentioned in your Note is not correct in my case, as I took great pains when painting the picture to visit the locality to obtain all possible information. FRED ROE.

*** The very small bit of "flamboyant" detail in the tracery of one panel might well escape notice, and, after all, it does not represent anything that is not found occasionally in late English Decorated work. The Norman capital is not exactly the same in France; it very soon took an English form, and if Mr. Roe looks under "Chapiteau" in Viollet-le-Duc, he will see that the French architect only gives the duplex form of cushion capital as characteristic of France, and refers to that as found "all over Germany and in the Rhine provinces of France." The general aspect of the interior in the picture is certainly English, and, whatever painters may think, to architects it must seem an odd proceeding to seek local colour for a French interior by making a study from an English interior.—ED.

BUILDING IN GUERNSEY.

SIR,—Will you kindly allow me to inquire through your columns whether any reader can furnish me with the names of two or three reliable builders in Guernsey, Channel Islands; also (roughly speaking) to what extent prices exceed London prices for domestic work. J. H. GREGORY.

METRES AND FEET.

SIR,—Kindly help a dull boy anent the Egyptian competition. He has drawn a design in English feet of the size demanded, namely 1-500 m., but it is necessary to figure it in mètres and millimètres. What is the rule? or does any book contain a table?

Holtzapffel says the mètre is equal to 39'371.* Murray (the publisher) in "Guide to France," 3'281. Morgan, 3'37.—Yours respectfully, HERBERT.

*** A French mètre is, according to our information, 3'2809 English feet, which coincides almost exactly with "Murray."—ED.

The Student's Column.

DETAILS OF RURAL WATER SUPPLY.—XII.

AMONGST the principal materials employed in waterworks construction the following are included:—Iron (cast and wrought), steel, copper, lead, zinc, tin, brass, gun-metal or bronze, stone, bricks, concrete, cement, lime, gravel, sand, clay, and wood.

Cast and wrought iron and steel are made from "pig-iron," which is manufactured from iron ore. Pig-iron is the name given to the crude unpurified metal in the form that it is first obtained from the blast furnaces, and is classified as:—1. Bessemer, 2. Foundry, 3. Forge.

Bessemer "pig" is dark grey, contains a large proportion of free carbon, a small quantity of silicon and manganese, and is practically free from sulphur and phosphorus. It is principally used for conversion into steel (Bessemer process). Foundry "pig" contains a large proportion of free carbon, and is therefore specially adapted for foundry work. Forge "pig" contains little free carbon, and is therefore adapted for conversion into wrought-iron.

Cast-iron is obtained by remelting foundry "pig"-iron in a small furnace called a cupola. Inferior castings are sometimes run direct from the blast furnace. Cast-iron is sub-divided into:—1. grey, 2. white, 3. mottled.

Grey cast-iron is made from the best foundry pig, and produces the best castings. White cast-iron is made from forge-pig, and is only used for the most inferior descriptions of castings. Mottled cast-iron is a mixture of the grey and white varieties. If a little nitric acid be applied to a clean fractured surface of cast-iron it will give a black stain with the grey variety and a brown stain with the white variety. White and mottled cast-iron do not rust so readily as the grey variety. Chilled castings are produced by using metal moulds.

Malleable cast-iron is produced by subsequently heating castings in an annealing oven with some substance containing an excess of oxygen. The oxygen combines with the carbon in the casting to a certain depth, depending upon the length of exposure, rendering that portion of the casting similar to wrought-iron.

Cast-iron contains a large percentage of carbon (from 2 per cent. to 6 per cent.). It is chiefly used in waterworks construction in the manufacture of pipes, the bodies of sluice and other valves and appliances, in the heavy parts of engines and pumps, for roof-trusses, and for ironwork generally which will not be subjected to tension.

Wrought-iron is generally prepared from forge-pig, by puddling, after which it is rolled and converted into "puddle-bars." The different qualities of "puddle-bars" are:—1. Puddled or rough bars. 2. Merchant bar, or common iron. 3. Best bar. 4. Best best bar. 5. Best best best bar. 6. Scrap bar; which is again sub-divided into "best scrap" and "best best scrap."

Wrought-iron is practically free from carbon, and should not contain more than ·15 per cent. Wrought-iron is chiefly used in waterworks construction in the manufacture of tubes, for roof trusses, girders, and for iron-work exposed to tension, or where forging is necessary.

Steel is defined by Dr. Percy as "iron containing a small percentage of carbon, the alloy having the property of taking a temper." It contains from ·12 to 1·5 per cent. of carbon, and is, therefore, in composition, midway between cast and wrought-iron. Steel is manufactured in two ways:—

1. By extracting a portion of its carbon from

* *Inches*, we presume, and the two succeeding figures *feet*. Our correspondent is not very precise in his way of stating things.—ED.

cast-iron (Siemens' process). 2. By adding carbon to wrought-iron (Bessemer process).

The principal varieties of steel are :—

1. Blister steel. 2. Cast steel. 3. Mild steel. 4. Puddled steel.

Steel is chiefly used in waterworks construction for tubes, and largely in the manufacture of engines and pumps, for girders, and generally where high tensile strains have to be supported. The use of steel is rapidly superseding cast and wrought iron for most engineering purposes.

Copper is principally employed for roses or strainers for pumps, or at outlets to reservoirs; also for floats for ball-taps, &c.

Lead is used for joining cast-iron pipes, for making distributing-pipes, for weighting pump-valves.

Zinc is principally used for cisterns, covering roofs, and for covering iron to protect it from rusting (galvanising).

All wrought-iron tubes used for distributing water should be galvanised. This is effected in the following manner. The iron is cleaned, and after being heated, is dipped into molten zinc, which formes a protecting coating without injuring the iron.

Tin is used for coating water-pipes internally, so as to protect them from the action of the water.

Brass is an alloy consisting of copper and zinc, in proportions varying from 2 to 18 of copper, to 1 of zinc. Brass is used for bushes and bearing surfaces, but is inferior to bronze. It is largely used for valves and taps.

Gun-metal or *Bronze* is an alloy of copper and tin.

Soft Gun-metal contains 8 parts of tin to 92 of copper. Hard Gun-metal, 18 parts of tin to 82 parts of copper. Bell-metal, 23½, or 23, parts of tin, to 76½, or 77, parts of copper.

Bronze is fusible, and makes good castings. It is soft, uniform in texture, and wears evenly, and is therefore specially suitable for bearing surfaces, producing little friction. Its tenacity is high, and it does not corrode. It is extensively used for pump-barrels, valve-faces, slides, and screws, and also for making the best valves and taps.

The following table, taken from Unwin's "Machine Design," gives the safe limits of stress, with a live or varying load, to which most of the materials described above may be exposed :—

SAFE LIMIT IN LBS. PER SQUARE INCH.

Material.	Tension.	Compression.	Shearing.
Cast-Iron	3,600	10,400	2,700
Wrought-Iron Bars	10,400	10,400	7,800
,, ,, Plates	10,000	10,000	7,800
Soft Steel, Untempered	17,700	17,700	13,000
Cast ,, ,,	52,000	52,000	38,500
Copper	3,600	3,120	2,300
Brass	3,600	—	2,700
Gun-metal (or Bronze)	3,120	—	2,400

Stone is used in waterworks construction, in building the walls of reservoirs and filter-beds, in the erection of engine and pumping houses, and in the manufacture of concrete. Except, however, where stone is plentiful and easily worked, masonry is generally superseded by brickwork or concrete. Any hard stone may be used for concrete, though limestone perhaps give the best results.

Bricks are almost indispensable in waterworks construction for the purposes mentioned above in connexion with stone, and often form a heavy item of expense.

The best quality of bricks should be used, especially for outside work. The cost of these is, however, frequently prohibitive, and then the local productions, if there are any, must be carefully inspected by the engineer. Economy only begins when efficiency has been attained; but the efficiency of a material depends upon what is required of it. The varieties of bricks depending upon the materials used and the subsequent manipulation are almost endless. For general work, however, the variety known as "Stocks" will be suitable. These are hard-burned bricks, well-shaped and sound. Staffordshire blue-bricks are best for coping purposes. Good bricks should be sound, free from cracks and flaws, stones and lumps of any kind (especially lime). They should be regular in shape, uniform in size, their arrises or edges should be square, straight and sharply defined; their surfaces should be even, not hollow, and not too smooth. They should not absorb more than one-sixth of their weight of water. They should be hard and burnt so thoroughly that there is incipient vitrifaction throughout. They should give out a ringing sound when struck against one another. The cost of brickwork is calculated by the rod or by the cubic yard. A rod of reduced brickwork consists of 272 superficial feet, one and a-half bricks in thickness, and is equal to 11⅓ cubic yards. The following estimate of the cost of brickwork for a small reservoir may be useful as indicating the points to be included.

Cost of Brickwork per cubic yard.

	s.	d.	s.	d.
400 Stock bricks at 30s. per m....	12	0		
Cartage	3	0		
			15	0
1 to 4 { 1⅓ bushels Portland cement at 3s. 9d.	5	0		
1 to 4 { 5⅓ bushels sand at 1s. 1½d.	6	0		
			11	0
Labour—Bricklayer: 5 hrs. at 6d.	2	6		
,, —Labourer: 5 hrs. at 3½d.	1	5½		
			3	11½
			£1	9 11½

Say 30s. per cubic yard.

In this instance the bricks were obtained from a local brickyard, and were of inferior quality, but good enough for the work. A thoroughly good class of bricks would have cost 66s. per thousand, including railway carriage and extra haulage. The Portland Cement was Hilton & Anderson's, and cost 10s. 2d. per cask, less 3s. for returned empties, or 43s. per ton nett., on rail in London. There was no local sand suitable for mixing with cement. The sand estimated for was sea-sand, costing 4s. per ton on rail, and to this had to be added heavy railway carriage and haulage.

Brickwork in reservoirs should always be laid in Portland cement or the best hydraulic lime.

Concrete is extensively used in waterworks construction, both for foundations and for entire structures. The materials for concrete are :—1. The aggregate or body. 2. The matrix or mortar.

The aggregate may consist of broken stone, slag, bits of brick or almost any hard material. It should be broken to about a 2½-in. gauge. The matrix is either lime or cement and sand. The proportions in which the aggregate and matrix are taken should depend upon the proportion of void to solid in the former. This can be found out by filling a water-tight box of known capacity with the aggregate, and then noting the quantity of water that can be poured into the box without overflowing.

One cubic yard of stone, broken to 2½-in. gauge, contains 10 cubic ft. voids; one cubic yard of do., broken to 2-in. gauge, contains 10⅜ ft. voids; one cubic yard of do., broken to 1½-in. gauge, contains 11⅓ cubic ft. voids. Shingle contains 9 ft. cubic voids. Thames ballast (which contains the necessary sand), contains 4½ cubic ft. voids.

If the aggregate consists of stones of various sizes, the voids will be reduced. When the concrete is intended for foundations where strength is necessary, and imperviousness is immaterial, the matrix may be slightly less than the voids. If, however, imperviousness is the first consideration the matrix must *exceed* the voids.

The following is an estimate of the cost of concrete for the work above referred to :—

Materials for 1 cubic yard of concrete (6 parts broken stone to 1 part mortar):—Broken stone 6 parts = 27 cubic ft.; sand 2 parts = 9 cubic ft.; Portland cement, 1 part = 3·51 bushels.

Days of a Bricklayer's Labourer.

	Per cubic yard.	
Measuring the materials	·04	Hurst's Handbook.
Turning over twice	·06	
Filling into barrows	·05	
Wheeling, say 25 yards	·03	
Levelling in layers.....	·02	
Ramming	·03	
	·23	

Estimate per Cubic Yard of Concrete.

	£	s.	d.
Broken stone (2½-in. gauge) 27 cubic ft. at 2s. 6d.	0	2	6
Sand, 9 cubic ft. at 17s. 6d. per ton.	0	7	10½
Portland Cement, 3·51 bushels	0	13	2
Labour, ·23 days at 2s. 11d.	0	0	8½
	£1	4	3

The concrete should be mixed dry on a wooden platform, the materials being measured by means of wooden boxes without bottoms, turned over twice, sprinkled with sufficient water through a rose, turned over until thoroughly mixed, filled into wheel-barrows, wheeled to the site, tipped gently into position, and well rammed in 12 inch layers. One cubic yard is sufficient for one mixing.

Cement.—The cement most used in waterworks construction is Portland cement. It is used for making mortar, concrete, and for rendering. The following estimate in connexion with the reservoir above referred to for rendering may be useful.

Cost per superficial yard of rendering on brick-work, ¾-in. thick, 1 of Portland cement to 2 of sand :—

		s.	d.
Portland Cement	·21 bushels at 3s. 9d.	0	9½
Sand	·42 ,, ,, 1s. 1d.	0	5½
Plasterer and Labourer	·08 days 14s 7d.	1	2
		2	5

Portland Cement is grey in colour, weighs from 112 lbs. per striked bushel, and should be ground so fine that after passing through a sieve containing 2,500 meshes to the square inch, the residuum shall not exceed 10 per cent. Briquettes made from the cement and immersed in water, when sufficiently set, for seven days, should be capable of sustaining a tensile stress of at least 300 lbs. to the square inch.

Lime.—Hydraulic limes or limes capable of setting under water, are frequently used in waterworks construction, either alone or mixed with cement. The blue and brown Lias limes are examples. If of good quality they give excellent results.

Gravel is used for filter-beds and for making concrete. In either case it must be clean and free from vegetable matter.

Sand is used for filter-beds, and for mixing with cement and lime for mortar, and for making concrete. For filter-beds the sand must be clean, uniform, but not too fine in grain, sharp, and approaching pure silica as closely as possible. For mortar and concrete the sand should be perfectly clean, free from clay or other impurities; the grains should be sharp and angular.

Clay is largely used for puddling. It should be free from sand and vegetable matter, and should not contain soft friable stone; but the presence of a certain amount of gravel in it is advantageous, and may be necessary ("Waterworks Engineering," by Turner and Brightmore). The clay should be freed from all vegetable matter, and should be exposed to the weather or "weathered" for as long a period before use as possible. It should then be spread out flat and cut across in every direction and thoroughly worked with spades, sufficient water being added and the whole mass reduced to a stiff homogeneous consistency. It should then be rammed into position in very thin layers.

Wood is used in roof trusses, and in the construction of floors, doors, &c., in various parts of the work. It is also used for pile foundations. Oak, beech, and elm are the best suited for the latter purposes.

Innumerable tables have been published giving the relative strength of various materials to support loads. These strengths should never be approached in actual practice, and large margins should be allowed in designing structures from them. The following table of "Factors of Safety" is given in Unwin's "Machine Design."

Factors of Safety for—

	DEAD LOAD.	LIVE LOAD. In temporary structures.	In permanent structures.	In structures liable to shocks.
Wrought-iron	3	4	4 to 5	10
Cast-iron	3	4	5	10
Timber	—	4	10	—
Brickwork	—	—	6	—
Masonry	20	—	20 to 30	—

In the last number of "Student's Column" there was a mistake in formula 3 (page 193, foot of second column), through the substitution of a + sign for ×. It should read :—

$$G = \sqrt{\frac{(3\,d)^5 \times h}{l}} \cdot \frac{r^4 l}{1{\cdot}394\,d + r^4 l}$$

OBITUARY.

DR. HEINRICH BRUGSCH.—We have to record the death of the well-known Egyptologist and archæologist Dr. Heinrich Brugsch Pacha, after a long and severe illness. Dr. Brugsch first visited Egypt in 1853, where he lived for some time in the desert with Mariette Bey, the illustrious French explorer of Memphis fame. In 1857 he again visited Egypt, and undertook an archæological expedition up the Nile in conjunction with Mariette. Two years later he, in consequence of his knowledge of Persian, was attached to the first Prussian mission to Persia, and on the death of the resident Minister, Herr von Minntoli, was appointed his successor. On his return, in 1861, he wrote his work, "The Journey of a Prussian Mission in Persia." From 1864 to 1868 he acted as Prussian Consul at Cairo, and, after a short interval spent as Professor at Göttingen University, he returned to Egypt at the invitation of the Viceroy, Ismael Pacha, to found a European Oriental school for the deciphering of hieroglyphics. At the opening of the Suez Canal in 1869 he was brought into contact with a number of distinguished personages, some of whom he subsequently accom-

panied on tours through Egypt, and thereby gained various distinctions. At a later period he accompanied the Crown Prince Rudolph and Prince Frederick Charles of Prussia. In 1884 he was appointed interpreter to the German Mission to Persia, and on his return was decorated with the Crown order. Since that time he has lived at Berlin, where his lectures and writings were distinguished as much by clear insight and scholarship as by an easily comprehensible and popular style.

PROFESSOR FABRETTI, the well-known Italian archæologist, died on the 16th inst. After the Revolution he was forced into exile at Turin, where he became director of the Museum of Antiquities, and Professor of Archæology at the University. He was appointed a Senator in 1889.

GENERAL BUILDING NEWS.

PENISTONE (YORKSHIRE).—The Sheffield Union Banking Company are engaged in the erection of a range of new premises on a site in the old market-place which was formerly occupied by the old Penistone Grammar School, erected in 1397. The Grammar School has been removed to Weirfield, a large house having been purchased and made into a school. The new buildings in the Market-place include a post-office, which will take the place of the present office, now housed in a building erected in 1763 as a cloth hall or shambles, at a cost of 800*l.*, by the Wordsworth family, who for generations resided at Water Hall, near Penistone, where William Wordsworth, the poet, was born in 1776. In addition to the post-office, the new buildings will accommodate the Sheffield Union Banking Company, and will also provide other business premises. The work is being carried out by Messrs. Hawley Bros., of Penistone, from designs by Mr. J. D. Webster, of Sheffield.

CITY OF LONDON SCHOOL FOR GIRLS, CARMELITE-STREET, VICTORIA EMBANKMENT.—On the evening of the 13th inst. the above new schools, erected by the munificence of the late Mr. Wm. Ward, of Brixton, on a site provided by the Corporation, were opened. A conversazione was held on the occasion, at which Mr. Claudius C. Algar, chairman of the Law and City Courts Committee, stated that the principal hall would receive 250 girls. The school at large had 71½ ft. frontage, 51½ ft. depth, and 3,683 ft. superficial area. The new building adjoins the Guildhall School of Music.

NEW WESLEYAN CHAPEL, LEEDS.—On Saturday last (15th inst.) a new Wesleyan chapel was opened in Roundhay-road, Leeds, in future to be known as Trinity Chapel and Schools. The structure, according to the *Leeds Mercury*, has cost 8,320*l.*, and there has been contributed in aid of the building fund 5,036*l.*, leaving a deficiency of over 3,000*l.* The edifice is of pressed bricks, and in the Italian style of architecture. The architect is Mr. G. F. Danby. The body of the chapel is divided into four aisles. The centre seats are straight, those at the sides circular, while the choir stalls are on either side of the pulpit. The minister's vestry, a church parlour, and a ladies' workroom, are to be built hereafter between the school and the chapel. The contractors were Mr. Thomas Hannam, builder; Mr. Joseph James, joiner; Messrs. Lazenby & Co., plumbers; Mr. T. Moore, plasterer; and Messrs. J. & H. Smith, ironwork and warming.

WESLEYAN CHURCH, CHEETHAM, MANCHESTER.—The memorial-stones of this church, which is being erected in the Wilton Polygon, facing Bury Old-road, Cheetham Hill, were laid on the 15th inst. The edifice, designed by Messrs. William Waddington & Son, architects, of St. Ann's-square, will be Gothic in style. The spire is to be 150 ft. in height, and the main gable of the building will be flanked by octagonal buttresses terminating in pinnacles. The total cost is estimated at 11,000*l.*

CHURCH RESTORATION, ST. GERMAN'S, CORNWALL.—The restoration of St. German's Church has now been completed at a cost of about 6,000*l.*, and the edifice was re-opened last week. The new choir-stalls, parclose screen, and other carving works have been done by Messrs. Harry Hems & Sons, of Exeter. These are all of English oak, and into the screen much fifteenth-century Cornish wood-carving in the same material has been incorporated. The stalls have a distinct individuality and interest thrown into them by the introduction of a number of scenes in St. German's life, sculptured in high relief in the bench-ends. Messrs. St. Aubyn & Wadling, of London, are the architects under whom the works have been carried out.

PARISH CHURCH, RUGBY.—When the parish church at Rugby was rebuilt a few years ago the plans included a tower, spire, and vestries, but for want of funds—the other work having cost upwards of 20,000*l.*—these portions were deferred. Mr. J. C. Benn, of Rugby, has generously offered to defray the cost of completing the church, and the work, which will be carried out under the direction of the original architect, will be put in hand as soon as possible.

NEW CHURCH, BAMBER BRIDGE, NEAR PRESTON.—On Saturday last, the 15th inst., the Bishop of Manchester laid the memorial stone of the church to be erected in School-lane and Withy Trees, Bamber Bridge. The style adopted is Late Decorated Gothic; the building will accommodate 800 people, and the whole is estimated to cost £5,000. Mr. R. Knill Freeman, of Bolton and Manchester, is the architect.

TECHNICAL SCHOOL BUILDINGS, BURY, LANCS.—The Earl of Derby opened the new technical schools at Bury on Saturday last, the 15th inst. Their total cost, including the site and furnishing, is about 21,000*l.*, of which 16,000*l.* is for the actual building. The style of architecture adopted is Classic, with Renaissance ornament. The *Bury Guardian* states that the main front is entirely of dressed stone from the Cuttingworth Quarries, and consists of a central main entrance projecting from the face of the main building, and carried up to the roof with a carved centre panel of stone, with figures in relief representing Art, Science, Literature, Mechanics, Electricity, &c., a centre dormer of three lights terminating with the roof. The basement rooms and ground-floor front rooms are lighted by large windows with embossed Grecian key ornament borders, over which are four stone panels of large dimensions, filled with sculpture in relief representing various manufactures, the arts and sciences, history, painting, geography, shipbuilding and various industries. The series when complete will be a study for students in carving, drawing, and modelling. Rising from the centre of the group of buildings is a large shaft or tower, the height of which is 100 ft. This shaft is divided into four flues, each flue being for a distinct purpose—viz., one for the exhaust of the gas or steam engine, one for the fumes which are aspirated by means of an electric fan-motor from the chemical laboratory combustion chambers and chemical lecture theatre, one for the heating apparatus, and one for general ventilation of the building. The whole of the roofs are covered with green Westmoreland slates. In addition to the special arrangements made to draw off the noxious fumes that arise in the laboratory, it is also ventilated by a large and specially-designed ventilator connected to 15-in. galvanised flues, with three outlets. Under each outlet is a large sunlight to aid ventilation in certain conditions of the atmosphere. The main buildings, the chimney-stacks, &c., are of local brick faced with the best Accrington red pressed bricks, relieved with stone dressings. The two main fronts to Broad-street and Mosse-lane have stone facing. The principal staircase window, consisting of thirty large lights, is filled with stained glass, with appropriate coat-of-arms and badges. In other parts of the building the doors, panels, and screens are filled with stained glass, with figures and emblems relating to Science and Art. The whole of the stained glass and leaded lights have been specially designed and executed by Messrs. A. Seward & Co., of Lancaster. The lighting throughout is by electricity, on the single parallel system. All the staircases and corridors are fireproof; and the building is heated by hot water, on the low-pressure system. The whole of the buildings, &c., were designed by the Borough Engineer, Mr. J. Cartwright, and the bulk of the work has been executed by local contractors.

SCHOOL BUILDINGS, HALSTEAD, ESSEX.—On the 13th inst., the memorial stone of the class-rooms to be added to the new Congregational Church school buildings was laid by the Chairman of the Essex Congregational Union. The buildings will be of white brick, with stone dressings; the work is being carried out by Mr. W. Sudbury, sen., of Halstead.

HEATHERDENE CONVALESCENT HOME, HARROGATE.—The foundation-stone of a new wing to this building, which is an adjunct of the Sunderland Infirmary, was laid on Saturday last, the 15th inst. It will be three stories high, the ground-floor being devoted to the administrative department, the wards being on the first and second floors. The corridor of the present building will be continued to the new wing, leading into a lofty and spacious hall. The total cost of the extension, including the furniture and some land purchased for future addition (amounting to 1,000*l.*), is 4,500*l.* The architect is Mr. John Eltringham, of Sunderland, and the contractors, Messrs. Ives & Co., of Shipley.

WESLEYAN CHURCH, BEBINGTON, CHESHIRE.—Mr. T. Taliesin Rees, of Birkenhead, has been commissioned to carry out the proposed church and schools. The style will be Late Gothic, and the materials are of red pressed bricks with white local stone dressings and tracery. It is the intention of the Committee at present only to erect the school-chapel, which contains seating accommodation for 250 adults, minister's vestry, two class-rooms, kitchen, w.c.'s, lavatory, &c. The future church has been arranged to seat 600 adults, with church parlour, vestries, organ chamber, &c.

SANITARY AND ENGINEERING NEWS.

SKELTON AND BROTTON SEWAGE DISPOSAL.—A Local Government Board inquiry was held recently at the Local Board Offices, Skelton-in-Cleveland, by Mr. W. J. B. Clerke, M.Inst.C.E., Engineering Inspector. There was a large attendance, including representatives from the Saltburn Local Board, who some time ago obtained an injunction at the County Court to prevent the Skelton and Brotton Local Board from polluting with sewage from their district the Skelton Beck, which flows through Saltburn. The inquiry was held to obtain the sanction of the Local Government Board to borrow £14,500 for works of sewerage and sewage disposal which will prevent this pollution. The scheme, which is of a complex and difficult nature, is from the designs of Mr. D. Balfour, M.Inst.C.E., of Newcastle-on-Tyne, and comprises about ten miles of 21, 18, 15, 12, and 9-inch sanitary and iron pipes, with manhole and lamp-hole shafts, flushing chambers, and iron pipe valley crossings. The work consists of a combined intercepting scheme for conveying the whole of the sewage from the ten villages comprised in the Board's district to a point at the top of cliffs on the coast, where the cliffs, 200 ft. in height, will be bored and lined with iron pipes, which will be jointed at the bottom with iron pipes having easy bends, laid in a heading driven from the beach, and then, by means of cast-iron pipes laid in a cutting in the rock of which the beach is composed, the sewage will be delivered at lowest point of the furthest ebbing tide. The scheme was explained, and other evidence given by Mr. Balfour, on behalf of the engineer, after which the inspector visited the whole of the district.

WATER SUPPLY AND SEWERAGE, BEDLINGTON.—The Local Board had the water scheme under consideration at its meeting on the 13th inst., when a communication from the Local Government Board was read to the effect that the department had decided to comply with the Local Board's application for sanction of a loan of 2,400*l.* for waterworks, except so far as regards the sum of 97*l.* required for cleaning out the present filter-bed and for repairing walls, which should be paid out of the current rates. With reference to the application for a loan of 600*l.* for sewerage works, the Local Board was requested to take steps to acquire land upon which the sewage may be purified before it passes into the streams, which are feeders of the river Blyth,, and when this was done a revised estimate should be sent in. A local committee was appointed to consider the matter.

STAMFORD DRAINAGE.—The Town Council of Stamford met on Monday last (17th inst.) to consider a report upon the drainage and water supply of the town, prepared by Mr. R. H. Bicknell, C.E., of Lincoln. He reported that the cost of excavation would be somewhat high, owing to the drains having to be laid for the most part in rock. A system of ventilation by means of manholes, or lampholes, is provided, and he proposes to construct five large arteries, or storm-water mains, which will take in the whole of the storm-water, utilising, as far as possible, the existing drains for that purpose. He recommends the adoption of the International system of purification at the outfall works. With regard to the water supply, Mr. Bicknell says there is abundance of water in the neighbourhood, which, however, is at present only partially used. He estimates the cost of carrying out his drainage scheme at 30,000*l.*

INFECTIOUS HOSPITAL, &C., EAST GRINSTEAD.—At the last meeting of the East Grinstead Local Board a resolution was passed to apply to the Local Government Board for sanction to borrow 3,500*l.* to build an Infectious Hospital, according to plans prepared by Mr. Wm. Willis Gale, their Surveyor, and also for 500*l.* for works of permanent improvement on the main road.

WATER SUPPLY OF LIVERPOOL: NEW AQUEDUCT OPENED.—On Tuesday last (18th inst.), the Lord Mayor of Liverpool formally turned on the valve at Kensington reservoir permitting a direct supply from Vyrnwy Lake through the new aqueduct just completed between the city and the Prescot reservoir. In the course of a somewhat lengthy report the *Liverpool Daily Post* remarks that the new main just completed from Prescot has been laid in accordance with a recommendation of the water engineer, approved by the Council on April 5, 1893. The aqueduct consists from Prescot to Knotty Ash of cast-iron pipes 3 ft. 4 in. internal diameter and, with the exception of two short lengths of steel tube, of cast-iron pipes of 3 ft. diameter from Knotty Ash to the Kensington Reservoir, Liverpool. The Cheshire Lines Railway at Knotty Ash and the London and North-Western Railway at Stanley are crossed by means of rivetted steel tubes of the same diameter as the cast-iron pipes. The aqueduct commences by a junction with the Vyrnwy pipes where they cross the Eccleston-road at a distance of 242 yards from the inlet of the Prescot reservoir. There is also a junction in the same road with the Rivington aqueduct, and these junctions are so arranged that water can be turned into the new main either from Vyrnwy or Rivington direct. At Eaton-road, West Derby, the 40-in. pipes terminate, and a branch main of 2-ft. internal diameter is taken off to convey water to the intended new reservoir at Breeze Hill, Walton. The latter main has also been completed, with the exception of crossing the Cheshire Lines Railway at West Derby Station. Past the point of juncture the 40-in. pipes are reduced to 36 in.. and this diameter is continued along the Prescot-road to the Kensington reservoir. The total length of the new pipe-line between Prescot and Kensington is nearly 7½ miles. The principal feature and object of these mains is to carry forward to the City and to Bootle the full quantity of water which the present Vyrnwy pipes are capable of conveying. The quantities conveyed in ordinary full work will be about 10,000,000 gals. per day into Kensington, and 6,000,000 gals. per day into Breeze Hill. The whole of the cast-iron pipes employed have been supplied by the Staveley Coal and Iron Co., Limited, whilst the steel tubes crossing the Cheshire Lines Railway at Knotty Ash were made by Messrs.

Fawcett, Preston, & Co., of Liverpool, and the steel tube crossing the Stanley Bridge of the London and North-Western Railway by Messrs. D. Rollo & Sons, Liverpool. The total expenditure on the main from Prescot to Kensington has been 63,000*l.*, 12,000*l.* less than the engineer's estimate, which was 75,000*l.* To complete the extensions and improvements recommended by the engineer for the water-supply of Liverpool, there still remain to be carried out the following works, of which the committee have approved, and which have been sanctioned by the City Council:—Service reservoir on Breeze Hill, estimated cost 35,000*l.*; distributing mains from Breeze Hill Reservoir, estimated cost 5,000*l.*; new high-pressure engine at Aubrey-street, with necessary pumps and boilers and connexions to present high-level tank; estimated cost 10,000*l.*

WATER SUPPLY OF ATHERSTONE.—The Local Government Board, before sanctioning the scheme of the Atherstone Guardians involving the borrowing of 11,412*l.* for water supply works for the parishes of Baddesley, Ensor, Baxterley, Bentley, and Merevale, wished to know whether the attention of the Authority's Surveyor had been drawn to (1) the spring at Wheatley's Wood (2) the Merevale spout, and (3) the water pumped from the colliery at Speedwell shaft, as possible sources of supply.—The Surveyor presented a reply at a meeting of the Guardians on the 18th inst. in which he stated that the supply at Wheatley's Wood was insufficient; that the Merevale spout ceased to flow on the 7th inst.; and that the water pumped from the Speedwell shaft could not be considered a supply for domestic purposes, as it came out of the Coal Measures.

SEWERAGE SCHEME, STAFFORD.—A special meeting of the Stafford Town Council was held on Tuesday, the 18th inst., to consider a report from the sewerage committee with respect to the proposed drainage scheme, at which it was mentioned that the Local Government Board would arrange to hold a public inquiry on the matter. The committee recommended that a contract be entered into with Mr. E. Tempest, of Manchester, upon his tendered schedule of prices worked out to a total of 21,320*l.*, and that the Backwalls North section of the proposed work be proceeded with at once, and the other sections continued as soon as the Local Government Board's sanction had been obtained, the contract being subject to any variations required by the Local Government Board. After some discussion the report was adopted.

KINGSBURY (TAMWORTH) WATER SUPPLY SCHEME.—At a meeting of the Tamworth Rural Sanitary Authority, held last Saturday, a letter was read from the Local Government Board with reference to the inquiry held in October last, into an application for sanction to a loan of £5,000 for establishing water-supply works at Kingsbury, to the effect that the board had again considered the circumstances and were advised that the chief objection to the scheme proposed by the authority was the risk of subsidence in consequence of mining operations, by which the supply of water to the well might at any time be diverted and lost. The board understood that such loss of water had actually occurred in the neighbourhood, and, moreover, that nearly the whole area of the parish of Ringsbury was underlaid with coal, for the extraction of which fresh workings were said to be imminent. The board could not fail to recognise that the adoption of the proposed scheme must involve considerable risk of loss of public money by the failure of the works. If, however, in view of that risk, the authority still considered it desirable to carry out the scheme contemplated, the board would be prepared to sanction a loan for the execution of the scheme when it had been amended. The board, however, still considered that it would have been preferable for the parish to have been supplied with water by the Tamworth District Waterworks Committee.

FOREIGN AND COLONIAL.

FRANCE.—M. Caniez, the sculptor, has just finished the colossal stone statue of "Grand Condé," which was commissioned by the State for the decoration of the grand staircase of the Ecole Supérieure at Geneva.——The Government has commissioned M. Loiseau Bailly, sculptor, to execute a marble bust of Gambetta, for the military school at Saint-Maixent.——An interesting Museum has been arranged at Nimes, consisting of inscribed stones belonging to the first four centuries of the Christian era. Until this time they have been thrown pell-mell into the celebrated "Maison Carrée." Not only have these been hidden there, but a great deal of débris of pagan statutes and architecture, which are so common in the south of France.——Very shortly a breakwater is to be made in the Gulf of Juan. The cost is estimated at 390,000 francs. In the Port of Guilvinec (Finistère), another breakwater is to be built at a cost of 100,000 francs.——There is a scheme for draining the lake of Grandlieu (Loire Inférieure) for agricultural purposes. The lake measures nine kilomètres from North to South, and seven kilomètres from East to West. It will cost two million francs.——A maritime laboratory has just been finished at Saint-Vast la Hougue.——At Beaulieu in the Department of Correzè, the bronze statue of General Marbot is shortly to be inaugurated. It is the work of M. Millet of Marcilly, who exhibited it this year in the Champs Elysées Salon.——A few days ago a fire took place at the Hotel de Ville at Verdun, and has almost entirely destroyed the museum in one part of the palace. It contained some interesting sculpture of the Middle Ages, and also some fine pictures ancient and modern, amongst them Bastien Lepage's "Chanson du Printemps."——The Departments of Gard and Vaucluse have built, by the help of the State, a "sanatorium" for very young children, in the Valley of Peyraub near Alzon (Gard.).——It is said that a new church of Sainte-Anne is to be built at Colonne Raudon (Algeria.)——There has just been a solemn inauguration at Puy (Haute Loire) of the fountains of Saint Paulieu.——MM. Mercié and Falguière, the sculptors, have just finished the model for the monument which the town of Toulouse is to raise to the memory of the poet Gondouli. The model is exhibited in the museum at Toulouse.

GERMANY.—The Berlin Art Exhibition was closed on Sunday last.——The new locks on the Muhlendamm were tried for the first time last week; the gates are all worked by hydraulic pressure.——A proposal to have a reproduction of "Old Berlin" in the time of the Electors at the 1896 Industrial Exhibition has been referred to the Berlin Historical Society. With a view to the Exhibition the railway authorities are about to build a new station at Treptow.——Two fountains are to be erected on the Schillerplatz at Berlin at a cost of 500*l.*——The sub-committee of the Municipality appointed to consider Messrs. Siemens' proposals as to the Berlin Overhead Metropolitan Electric Railway, has reported in favour of granting the concession for twenty years, subject to a payment of 2 per cent. of the annual gross receipts until the latter exceed six million marks, when the rate is to rise a quarter per cent. with every additional million marks gained.——The three Prussian Freemasons' Grand Lodges have voted 1,000*l.* towards painted windows in the Emperor William I. and Frederick Memorial Chapels. The sculptor, Josef Drischler, has been successful in a competition for a large statue of the Archangel Michael for the latter edifice.——It is announced from Crefeld that negotiations are taking place between the Chamber of Commerce of that city and the Belgian authorities, with a view to furthering the plan of a direct canal between Antwerp and the Rhine, *viâ* Crefeld.

MISCELLANEOUS.

NATIONAL MONUMENTS IN IRELAND.—According to the recently-issued report of the Irish Commissioners of Public Works for the year ending March 31, 1894, the amount spent by them on national monuments during that period was 1,447*l.* 10s. 1d., of which 473*l.* 8s. 7d. was for maintenance, and 974*l.* 1s. 6d. for restoration works. The largest part of the latter sum, 319*l.* 11s. 5d., was expended on the Abbey of Knockmoy, Galway, which was in a most dilapidated condition, the nave and chancel being crowded with *débris*. The upper portion of their walls and the conventual buildings were nearly falling. All that was necessary to maintain the Abbey in a proper state has been done, and a caretaker appointed. At Killmallock Abbey, Limerick, the expenditure was 1*l.* 13s. 4d. Owing to difficulties experienced as to the vesting of the Abbey little was done beyond preparing drawings, and carrying on preliminary work connected with the general survey. At Sherkin Island Abbey, Cork, an extensive ruin in a most dilapidated condition, 199*l.* 19s. 3d. was expended. Many of the walls were in a most dangerous state, and care had to be taken not to make matters more serious during the repairs, which were carried out satisfactorily. At Ennis Abbey, Clare, the expenditure was 93*l.* 4s. 4d. The Abbey had been used as a parish church, having been roofed in in 1819. All the woodwork of that date was ruinous, and had to be removed. The nave was excavated to its original level; arches which had been blocked in 1819 were reopened; and the usual repairs to walls effected. At Innisfallen Island, Killarney, where the ruins comprise an oratory, the ancient abbey, and surrounding conventual buildings, the expenditure was 161*l.* 10s. 9d. The date of the oratory is twelfth century; portions of the abbey the same, part of it thirteenth, and part sixteenth century. The oratory has been repaired and falling walls secured. The *débris* filling the interior has been removed, disclosing many curious and interesting tombs. The eastern gable, with two Early English windows, counterparts of those at Agadhoe, in the vicinity of Killarney, had fallen, but the windows were perfect, and have been replaced in their original positions. The high altar was discovered, and beneath it a curious relic, half bird, half fish, partly bronze and partly ivory. This relic has exercised the minds of learned societies, but no definite conclusion has been arrived at. Some further work is requisite on outlying portions of the conventual buildings, which it is hoped may be done this year. At Ballinskelligs, Kerry, are extensive ruins, having little architectural detail of importance, but an interesting history. Repairs were carefully carried out under an experienced clerk of works, at a cost of 72*l.* 16s. 1d. The expenditure on Glendalough Church, Wicklow—42*l.* 12s. 2d.—was for repairs to the roof of St. Kevin's kitchen, painting, &c., rebuilding a portion of the gable of St. Mary's church; the construction of a new bridge over the river, the former one having become dangerous through decay; cataloguing and fixing labels on the various fragments found from time to time, and stored in St. Kevin's kitchen. No other work was required. Owing to the careful way in which former repairs were done on the Quin Abbey, Clare, little remains to be carried out. The work mainly in connexion with the Dunboyne vault cost 38*l.* 19s. 8d. At Mellifont Abbey, Louth, the work done at a cost of 24*l.* 14s., consisted in repairs to portions of the walls which had fallen into disrepair since the last reparation. At Monasterboice, Louth. the cutting of ivy and the under-pinning of walls undermined by the digging of graves was all the work necessary, at an expenditure of 15*l.* 17s. At Athenry Abbey, Galway, extensive repairs were necessary. The walls required repair and pointing. The *débris* collected in the interior was removed. The fine tomb of the Beminghams was repaired, and all that was required to maintain the building done. The cost of these repairs is given at 3*l.* 3s. 6d., evidently an error, though the work in other cases seems to have been done at a marvellously cheap rate.

MANCHESTER TECHNICAL AND ART SCHOOLS.—We have received the syllabus for 1894–5 of the Municipal Technical School and Municipal School of Art at Manchester, giving a statement of the very extensive and varied educational work carried on in these schools. In the Art Schools the subjects include:—Geometry; Perspective; Freehand and Model Drawing; Architectural Drawing and Colouring; Drawing and Shading in Chalk, or with the Pen, or Brush; Painting in Oil, Water Colour, Tempera, &c., from Casts of Decorative Art, Landscape, Animals, and the Living Model, &c.; Memory Studies; Anatomical Drawing; Modelling in Clay, Plaster, and Gesso; Analysis of Ornament and of Plant Forms for Decorative Purposes; Designing for Manufactures and Decoration; Figure and Landscape Composition. Day and Evening Classes in Wood-Carving are held in the Technical School. Mr. Glazier is the lecturer on Architecture and Historic Ornament. Mr. Walter Crane is to give ten illustrated lectures on "The Basis of Design and Influences which Determine its Character."

NEW RAILWAY IN ABERDEENSHIRE.—On Saturday, 8th inst., the first turf was cut of the new Cruden Railway, to run from Ellon to Boddam, a fishing village on the Aberdeenshire coast near the town of Peterhead. The new line is 15½ miles in length, and the Boddam terminus is near Stirlinghill, where there are many granite quarries. Most of the quarries at Stirlinghill and Blackhill belong to firms in Aberdeen, and at present it is calculated that over 12,000 tons of granite is annually carted from these quarries to Peterhead and thence transmitted by rail to Aberdeen. The quarry-owners will be able by the new branch to send direct to Aberdeen not only blocks for building and monumental purposes, but large quantities of small stones (hitherto thrown into the sea) to be utilised for causewaying. The new line will accommodate an agricultural district as well as the fishing industry at Port Erroll, Longhaven, and Boddam; and the rock scenery on the coast is bold and picturesque. Mr. P. M. Barnett, C.E., Aberdeen, is chief engineer for the new line, which is being constructed by the Great North of Scotland Railway Company. The contractors for the earthwork and masonry on the new route are Messrs. Charles Brand & Son, Glasgow, and the ironwork of the bridges is divided between Messrs. Jas. Abernethy & Co., Ferryhill Foundry, Aberdeen, and the Cleveland Bridge and Engineering Works, Darlington. The line will be ready for traffic in the summer of 1896.

A VENTILATING AND WARMING CODE.—We have received from Mr. R. W. Boyd a useful card of thirty suggestions in regard to warming and ventilating churches, chapels, and large rooms. They are very good, and some of them very pithily expressed; the card is a good one to hang up in a vestry or lobby of a church as a caution and guide to the officials and churchwardens. The only point we demur to is the recommendation that several small outlets are better than one large one. Can we be sure that they will all act as outlets?

KING'S COLLEGE.—We have received the syllabus of lectures and classes in architecture at King's College, under the direction of Professor Banister Fletcher. The lectures will comprise the subjects in which candidates are examined at the Institute of Architects' examinations for Building Surveyor; the subjects in which candidates are examined at Carpenters' Hall in June in each year; and the subjects required in the examinations at the City and Guilds Institute and the Science and Art Department. All students have the advantage of borrowing books from the Architectural Reference and Lending Library.

WATERFORD AND SOUTH-EAST OF IRELAND ARCHÆOLOGICAL SOCIETY.—Last week the Society made an excursion by steamer to Dunbrody Abbey, where a paper upon the Abbey and its history was read by the Rev. P. Power, F.R.S.A., who was thanked on behalf of his auditors by Dr. Sheehan, Bishop of Waterford and Lismore.

RECREATION-GROUND, SOUTHPORT.—A Local Government Board Inspector held an inquiry at Southport on the 13th inst. with reference to an application by the Corporation of that city for

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*Museum for Antiquities, Cairo	Egyptian Government	First 600*l.* and 400*l.* between the next four	Mar. 1, '95

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered
Road Works, Bramley-street, &c.	West Hartlepool Corp.	J. W. Brown.....	Sept. 25
Sewer, Hesketh-road, Ashton-on-Mersey..	Altrincham U.R.S.A.	Jno. McKenzie	Sept. 26
Road Metal	Handsworth (Staffs.) Local Board	E. Kenworthy.....	do.
Shops, Market Yard.....	Pontypridd, &c. Town Hall Co.	A. O. Evans	do.
*Heating and Ventilation of Municipal Buildings	Plymouth Corp.....	J. Paton.....	do.
Forming and Paving, Plasturton-avenue, &c.....	Cardiff Corporation ..	*Official*	do.
Drainage, Long Melford	Sudbury (Suffolk) U.R.S.A.....	do.	do.
Sinking Well, &c. near Kilmacow, co. Kilkenny		do.	do.
Paving and Cementing, Cowper-street, &c.	Waterford Union	do.	Sept. 27
Flagging, &c. Seaforth, near Liverpool ..	Gateshead Corporation		
Premises, John William-street	Waterton-with-Seaforth Local Board	F. S. Yates	do.
Pipe Sewer (700 yards), Burn Cross, Chapeltown, Sheffield	Huddersfield Club....	Jno. Kirk & Sons	do.
Four Houses, Petworth, Sussex	Wortley Union	Geo. E. Beaumont....	do.
Schools, Whorlton, Durham.....	.....	Wm. Buck	do.
Brick and Concrete Sewers	.....	T. Leslie Anderson ..	do.
Sewerage Works	Padiham and Hapton (Lancs.) Local Board	Jno. Gregson	Sept. 29
Sewerage Works (two contracts).....	Littlehampton Loc. B.	H. Howard	do.
*Works at Sewage Farm	Whitworth (Lancs.) Local Board	H. L. Hinnell	do.
Hospital and Cottage	Shepton Mallet Local Board	J. Taylor, Sons, and Sauto Crimp	Oct. 1
*Refuse Destructor.....	Halstead (Essex) L. B.	Goodey & Cressall	do.
Alterations, &c. to Schools, Fleet and Longrow	Corp. of Dublin	S. Harty.....	do.
Cast-iron Pipes	Belper School Board..	M. Hunter.....	do.
Additions to Stores	Widnes Corp.	Isaac Carr.....	do.
Improvement Works, Archer-road.....	Darwen (Lancs.) Indus. Co-op. Soc.....	J. B. Thornley.....	do.
Re-laying Sewer, Salop-street	Penarth Local Board..	Edgar J. Evans	do.
Flagging, Kerbing, &c. Wallis-street.....	do.	do.	do.
	Sowerby Bridge (Yorks) Local Board	F. B. Rothera	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Road Materials	Seaford (Sussex) Loc. B.	B. A. Miller.....	Oct. 1
Providing, Laying, &c. Cast-iron Water Main (1,200 yds.)	Alnwick & Canongate Local Board	*Official*	do.
*Additions to Porter's Lodge, Outlet Sewer, &c. at Cemetery, Ilford.....	Com. of Sewers	do.	Oct. 2
*Warehouses, Kew Bridge	Brentford Loc. Bd.....	do.	do.
Hospital, Herringstone-road.....	Dorchester Town Coun.	G. J. Hunt	do.
Alterations, &c. to Schools, near Bristol..	Clutton Union.....	W. F. Bird	Oct. 3
Schools, Senior-lane.....	Royston School Board	Senior & Clegg	Oct. 4
Water and Drainage Works (2½ miles), Aboyne, N.B.	Deeside District Com.	Jenkins & Marr	do.
*Double Pavilion, &c. N. Hospital	Met. Asylums Board..	Pennington & Son	Oct. 5
Thirty-two Cottages, Clogh, Rathmoon, &c. Ireland.....	Baltinglass Union Guardians	*Official*	Oct. 6.
*Waterworks.....	Redruth Loc. Bd. '....	H. B. Nichols	do.
Surveyor's Materials	Batley Town Council	H. Dearden	Oct. 8.
*Reconstruction of Gover and St. Austell Viaducts.....	Gt. Western Railway	*Official*	Oct. 9
*Engine Sheds, Pits, &c. Taunton.....	do.	do.	do.
Bridge, Blaengarw, Glam	do.	do.	do.
Twenty-four Artisans' Dwellings, Abingdon	Governors of Christ's Hospital	J. G. T. West	do.
*Erection of Schools	Gillingham and Grange Kent U.D. Sch. Bd.	*Official*	Oct. 10
*Additions to Patent Office.....	H. M. Works.....	do.	Oct. 15
*Second Portion of Proposed New Buildings Post Office Savings Bank	do.	do.	do.
Steel Lattice Girder Bridge, over River Ness, Inverness, N.B.....	.....	J. A. Mackenzie	do.
Hospital, Laundry, &c.	Basford (Notts) U.R.S.A.....	H. Walker.....	Oct. 22
Two Houses, Ballynahinch, Ireland	R. F. Walker	Hy. Hobart	No date
Street and Sewer Work, Pudsey, Yorks. ..	.....	B. Walker.....	do.
Schools, Beeston Hill, Leeds.....	.....	W. S. Braithwaite	do.
Mission Hall, Corporation-road, Grangetown, Cardiff.....	.....	Habershon & Fawckner	do.
*Six Houses at Kilburn	.....		do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Assistant in Building Branch (Works' Dept.)	London C. C.....	200*l.*.....	Sept. 27
*Architect	London C. C. Asylums Committee	800*l.*.....	Oct. 1

Those marked with an asterisk (*) are advertised in this Number. Competition, *p.* iv. Contracts, *pp.* iv., vi., viii. *and* xx. Public Appointments, *pp.* xviii. *and* xx.

powers to borrow 2,900*l.* for laying out a new recreation-ground and other purposes. The Town Clerk explained that the grounds were to be established at the Duke and Crowlands end of the town. No opposition was offered to the application.

LIVERPOOL POST OFFICE.—The clerk of works for this, Mr. G. H. Woolven (not "Wolven," as given in our last) writes to add that the building is to be of Portland stone, supplied from Mr. John Pearce's quarry.

WEST HARTLEPOOL.—On the 12th inst. Mr. John Bird Clerke, A.M.Inst.C.E., one of the Local Government Inspectors, held an inquiry consequent upon the Corporation having applied for sanction to borrow 12,000*l.* for technical schools, 6,000*l.* for the erection of public abbatoirs, 3,976*l.* for works of sewerage and foot-paths, and 3,000*l.* for the erection of public library. The plans and schemes were explained by the Borough Engineer, Mr. J. W. Brown, the whole of them having been prepared by him, with the exception of the technical schools and lecture hall, which are the work of Mr. H. A. Cheers, of Twickenham.

ELECTRIC WORK.—The journal *Electricity* announces the publication, commencing on October 5, of a series of articles on "The Design and Specification of Electric Works, for architects and civil engineers. The articles will be written by Mr. Howard Pentland, Senior Surveyor to the Board of Public Works, Ireland, and Mr. A. H. Gibbings, Electrical Engineer to the Corporation of Hull. An analysis of the general principles on which electric work is based will be found in the Student's Column of the *Builder* for the half-year, January to June, 1890.

SUBSIDENCES AT NORTHWICH.—The Salt district of Northwich seems to have been more than usually affected by subsidences during the past fortnight. Last week the gable, back-walls, and ceilings of three cottages in Leicester-street, in the town, fell in; whilst on Saturday a serious landslip took place at Lostock, close to Northwich, on the premises of Messrs. Bowman, Thompson, & Co., Ltd. A brine pumping-station entirely collapsed, an enormous body of earth, together with a pumping-engine and a quantity of materials, disappearing into a chasm 40 ft. in diameter and some 20 ft. in depth. It is quite evident that this slip was caused by the brine runs at times not being fully saturated and having taken up a quantity of salt from the head of the rockbed.

BOROUGH POLYTECHNIC INSTITUTE.—In its prospectus for the forthcoming season, this Institute struction in Practical Geometry, Technical Drawing, announces a preliminary course of first year's in-Freehand and Model Drawing, and Elementary Mathematics. This course has been planned as a connecting link between school instruction and that of the workshop, and is preparatory to taking up the study of special trades. Among the new technical classes added is one on Pattern-making, and one on Practical Work in the Engineering Workshop.

THE HOLY CARPET OF ARDEBIL.—We have received from Mr. Rischgitz, of Linden-gardens, a very fine photograph of the celebrated Holy Carpet of the Mosque at Ardebil, now in the South Kensington Museum, for which, as some of our readers will remember, it was purchased at a cost of 2,500*l.* The photograph is of a large size, and gives the beautiful floral detail very completely. Students of Oriental ornament will find it worth while to possess a good representation of this splendid piece of work.

BUILDING TRADES.—According to the *Labour Gazette* a slight improvement is observable in most branches of the building trades throughout the country, though, as a rule, employment with the painters and plumbers is still moderate. The percentage of unemployed in unions connected with these trades has fallen from 3·6 to 3·4. During the month of August twelve new disputes arose in connexion with various branches of the trade.

LEGAL.

BREACH OF BUILDING BYE-LAWS.

AT Coventry Police Court on Monday, George Blakeman, builder, of Cope-street, Coventry, was summoned on three informations for breaches of the building bye-laws. Mr. G. Beard, Town Clerk, prosecuted, and Mr. S. R. Masser, solicitor, defended. The Town Clerk said that plans were forwarded by the defendant to the General Works Committee of two houses to be erected in Queen's-road, Coventry. The plans were returned to defendant's architect for alteration by the omission of a certain room shown on the original plan. The amendment was agreed to by defendant, but on the houses being inspected after completion it was found that the room had been erected, that it was not 9 ft. high, and that there was no fireplace or special means of ventilation. A certificate of completion was not granted, and the General Works Committee instructed the City Surveyor to take proceedings. The house had since been sold, and was now occupied by a tenant who had placed a bed and furniture in the room.

Mr. Masser contended that the room was not intended to be inhabited, but was built for a box-room, and his client should not be held responsible for any action of the tenant to whom he had sold the house.

The Bench fined the defendant on the first summons 5*l.* and costs, and on the second and third 1*l.* each and costs—8*l.* 17s. 6d. in all.

MEETINGS.

WEDNESDAY, SEPTEMBER 26.

Builders' Foremen and Clerks of Works' Institution.—Ordinary Meeting of Members. 8.30 p.m.

SATURDAY, SEPTEMBER 29.

Glasgow Architectural Association.—Visit to Linlithgow.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

16,039.—SECURING SASH-WINDOWS: *J. Whiteley.*—The gear for raising, lowering, and securing the sashes is a worm rotated by suitable means engaging with a rack. This dispenses with cords, weights, and fasteners. The sashes may be raised and lowered separately and simultaneously.

16,470.—IMPROVED PAVING: *T. C. Kitts.*—In order to afford a better foothold for horses, lead, finely powdered, or lead filings are mixed with asphalte in varying quantities to suit the different grades of the streets.

18,459.—WINDOW-SASH FRAMES: *D. Keith.*—Fittings are arranged in the lintels or case of the window-frame, or in or on the sash, which permit of it sliding up and down, and yet being opened into the room for cleaning or repairing.

18,719.—PROTECTION FROM FIRE: *T. & J. W. Witter.*—Pipes are placed above the windows, doors, or other openings, and these are connected with spreaders, so placed that when water is admitted into the pipes, it passes to the spreader, and is distributed in a thin sheet or film over the entire surface of the door or other opening.

20,056.—PREVENTING RATTLING OF WINDOWS: *R. H. Harry.*—To prevent the rattling of windows a light bracket is fitted on the top corner of the window-frame, and a screw with a pad and disc is so fixed that by screwing the disc round the pad it is forced against the window-frame and rattling is prevented.

12,111.—HINGE JOINTS: *Z. Leglay.*—An improved hinge which can be regulated at will, containing an oil chamber into which dust cannot enter. The construction,

which is well worked out, allows the working parts to be easily kept clean.

12,855.—KILNS: *J. Sherwin.*—To economise the fuel and to reduce the wear and tear in kilns, the heat is passed round the firing-box or chamber through those flues which are fed directly from the fire-mouths dividing under bottom of box, passing up and out of the front and back flues, which are not supplied with fire-mouths.

13,401.—CHIMNEYS CHIMNEY-POTS, &c.: *C. Hitchcock.*—An apparatus designed to be inserted in chimneys, chimney-pots, &c., for providing an upward current of air to carry off the smoke from domestic fires. This takes the form of two or more tubes with bell-shaped openings at the bottom, and a bend at the top with a tubular spigot. These are fixed in the chimney.

NEW APPLICATIONS FOR LETTERS PATENT.

SEPTEMBER 3. — 16,733, R. Thom, Stone-cutting Machinery.—16,740, S. Bromley, Machine for pressing Bricks.—16,748, H. Sanders and W. Matthews, Flushing Water-closets.—16,762, W. Cliff, Clay Baths.—16,764, J. Harris, Sash Fasteners.—16,772, F. Hedgeland, Mitre Clamps.—16,781, R. Haddan, Manufacture of Materials similar to Mosaic.

SEPTEMBER 4.—16,810, W. Wheeler, Waste-preventing Syphon-cisterns.—16,812, R. Rump, French Windows or Casements.

SEPTEMBER 5.—16,917, G. Bullock, Window-sash Fasteners.—16,919, F. Coates, Plug for Cisterns.—16,924, H. Burnet, Drain and Soil-pipe Testing Apparatus.—16,931, J. Marshall, Door Stop and Catch.

SEPTEMBER 6.—16,958, H. Robson and G. Calder, Connexions of Pipes to Taps. — 16,974, H. Greg, Machinery for rounding Square Wood.—16,988, M. Donne and C. Mathias, Self-closing Doors, Shutters, &c.

SEPTEMBER 7.—17,038, R. Frame, Ventilating Covers for Drain Traps, Soil-pipes, &c.—17,046, T. Houghton, Window.

SEPTEMBER 8.—17,134, W. Tomlinson, Portable Brick-making Machine.—17,147, E. Nowell and others, Sliding Sash Windows.—17,148, E. Nowell and others, French Casements. — 17,149, E. Nowell and others, Sash Windows.

PROVISIONAL SPECIFICATIONS ACCEPTED.

14,479, J. Slater and J. Hauvette, Ranges, Firegrates, Stoves, &c.—14,508, P. Daw, Sash-pulleys, &c.—15,417, W. Haslam, Domestic Fire-places.—15,775, E. Taylor, Construction of Fire-resisting Curtains for Closing the Proscenium Openings of Theatres, &c.—15,811, F. Jacks, Back-draught Preventing Chimney-top and Ventilator.—15,834, H. Wood, Bricks.—15,840, W. Garland & W. Shears, Raising, Lowering, and Securing Window-sashes. 16,125, J. Earnshaw, Chimney Flue for Cottages, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

17,159, W. Wilson and W. Priest, Paints.—20,473, S. Addison, Drain Stoppers.—20,791, B. Dawson, Lime Kilns.—21,012, P. Winn, Waste Fittings for Baths, Lavatories, Sinks, &c.—21,167, J. Westwood, Corrugated Flooring for Briges, &c.—9,546, H. Haddan, Kilns.—14,843, W. Thrift, Draught Preventer for Doors, &c.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

SEPTEMBER 10.—By *J. Baker & Sons*: Walme-lane, Willesden, the residence "Fir Lawn," and o.a. 1 r. 36 p., f., 1,290*l.*—By *Brodie, Timbs & Co.*: 1, 15 and 16, Coombs-st., City-rd., u.t. 29¾ yrs., g.r. 10*l.* 15s., r. 92*l.*, 60o*l.*; 14 and 17, Coombs-st., u.t. 29¾ yrs., g.r. 8*l.* 10s., r. 67*l.*, 43o*l.*; 13, City Garden-rd., u.t. 29¾ yrs., g.r. 3*l.* 5s., r. 31*l.* 4s., 200*l.*; 11, 17 and 19, City Garden-rd, u.t. 29¾ yrs., g.r. 16*l.* 15s., r. 93*l.*, 585*l.*

SEPTEMBER 11.—By *G. Stockings*: 63, Westbourne-pk. Cres., Bayswater, u.t. 65 yrs., g.r. 8*l.*, 365*l.*; 10, Chichester-pl., Harrow-rd., u.t. 65 yrs., g.r. 8*l.*, r. 42*l.*, 375*l.*; 10 and 11, Haverstock-rd., City-rd., u.t. 29¾ yrs., g.r. 4*l.* 10s., r. 70*l.*, 580*l.*; 12, Haverstock-rd., u.t. 29¾ yrs., g.r. 5*l.* 5s., r. 37*l.*, 215*l.*; 13 and 14, Haverstock-rd., u.t. 29¾ yrs., g.r. 10*l.* 10s., r. 60*l.*, 430*l.*; 15 to 18, Haverstock-rd., u.t. 29¾ yrs., g.r. 22*l.*, r. 122*l.*, 860*l.*—By *Weston & Son*: 22, Wiltshire-rd., Brixton, u.t. 67 yrs., g.r. 9*l.*, 445*l.*; 52, St. George's-rd., Camberwell, u.t. 40 yrs., g.r. 4*l.*, r. 24*l.*, 205*l.*; 10 and 12, Rignold-rd., u.t. 72 yrs., g.r. 12*l.*, r. 82*l.*, 565*l.*; 50 and 52, Rignold-rd., u.t. 72 yrs., g.r. 10*l.*, 375*l.*; 6, Linom-rd., Clapham, u.t. 72 yrs., g.r. 5*l.* 10s., r. 28*l.*, 200*l.* — By *St. Quintin & Son*: 14, Gurney-st., Walworth, u.t. 72 yrs., g.r. 8*l.*, r. 48*l.*, 270*l.*; 1, 3, and 5, Grayland's-rd., Peckham, and 15, Lidgate-rd., u.t. 70 yrs., g.r. 20*l.*, r. 124*l.* 16s., 545*l.*; 10, 21, and 23, Crewdson-rd., Kennington, u.t. 94 yrs., g.r. 25*l.* 10s., r. 150*l.*, 1,220*l.*—By *Holcombe & Betts*: 16, 17, and 18, Antcliff-st., Commercial-rd., E., u.t. 33¾ yrs., g.r. 4*l.* 16s., 595*l.*; 19 to 24, Antcliff-st., u.t. 33¾ yrs., g.r. 15*l.*, 1,160*l.*; 25 to 30, Antcliff-st., u.t. 33¾ yrs., g.r. 17*l.* 2s., 1,090*l.*; 1 and 2, Bromehead-rd., u.t. 33¾ yrs., g.r. 3*l.* 4s., 185*l.*; 29 and 30, Newnham-st., Whitechapel, u.t. 36¾ yrs., g.r. 6*l.* 10s., 465*l.*; 18 to 24, St. Mark's-st., u.t. 36¾ yrs., g.r. 20*l.* 15s., 3,020*l.*; 13 and 14, Tenter-st., North, u.t. 36¾ yrs., g.r. 6*l.* 10s., 435*l.*

SEPTEMBER 12.—By *W. Bradly*: 516, Woolwich-rd., Charlton, u.t. 31 yrs., g.r. 12*l.*, 190*l.*—By *Osborn & Mercer*: "Orchard Court," Herts, Stevenage, and 3 acres, f., 4,200*l.*; f. house and shop, High-st., r. 28*l.*, 595*l.*; f. house and shop, High-street, r. 37*l.* 12s., 605*l.*; the Police Station, u.t. 976 yrs., r. 29*l.*, 715*l.*; f. residence, r. 18*l.*, 410*l.*; a plot of f. land, r. 5*l.*, 100*l.*; f. residence, r. 50*l.*, 710*l.*; four f. cottages, r. 47*l.*, 980*l.*; f. residence, r. 32*l.*, 565*l.*; f. residence and stabling, r. 28*l.*, 525*l.*; f. coal wharf and warehouse, r. 40*l.*, 730*l.*; f. plot of land, 140*l.*; f. house and shop, r. 40*l.*, 660*l.*

SEPTEMBER 13.—By *C. C. & T. Moore*: 119, Grafton-st., Mile End, u.t. 32 yrs., g.r. 2*l.* 10s., r. 27*l.*, 220*l.*; 85, Ely-pl., a plot of f. land, 300*l.*—By *Newbon & Co.*: "Florence Villa," Granville-rd., Wandsworth, f., r. 36*l.*, 43*l.*; 81, Oxford-rd., Islington, u.t. 58 yrs., g.r. 7*l.*, 340*l.*; 23, Salamanca-st., Vauxhall, u.t. 11 yrs., g.r. 5*l.* 5s., 30*l.*; 1 and 2, Windsor Cottages, u.t. 11 yrs., g.r. 3*l.* 10s., 50*l.*; 8 and 10, Brunswick-st., Hackney, u.t. 43 yrs., g.r. 5*l.*, 315*l.*

[*Contractions used in these Lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.	ton	8/0/0 — 0/0/0
Teak, E.I.	load	10/0/0 — 16/0/0
Sequoia, U.S.ft.cu		2/3 — 2/6
Ash, Canada load		3/0/0 — 4/5/0
Birch, do.		2/15/0 — 4/0/0
Elm, do.		3/15/0 — 5/0/0
Fir, Dantsic, &c.		1/5/0 — 3/0/0
Oak, do.		2/10/0 — 4/10/0
Canada		5/15/0 — 7/5/0
Pine, Canada red		2/10/0 — 3/0/0
Do. Yellow		3/0/0 — 5/5/0
Lath, Dantsic, fath		4/10/0 — 5/10/0
St. Petersburg		5/0/0 — 6/10/0
Wainscot, Riga, &c., log		2/15/0 — 5/0/0
Odessa, crown		2/15/0 — 5/0/0
Deals, Finland 2nd & 1st std 100		7/10/0 — 9/10/0
Do. 4th & 3rd		7/0/0 — 8/10/0
Do. Riga		7/10/0 — 9/0/0
St. Petersburg, 1st yellow		10/0/0 — 13/0/0
Do. 2nd yellow		8/0/0 — 10/0/0
Do. white		8/10/0 — 11/0/0
Swedish		7/10/0 — 16/0/0
White Sea		7/0/0 — 15/0/0
Canada, Pine 1st		22/10/0 — 27/0/0
Do. do. 2nd		17/0/0 — 18/0/0
Do. do. 3rd, &c.		7/10/0 — 10/10/0
Do. Spruce, 1st		8/10/0 — 11/0/0
Do. do. 3rd & 2nd		6/10/0 — 7/10/0
New Brunswick		6/0/0 — 7/5/0
Battens, all kinds		3/0/0 — 15/0/0
Flooring boards, sq., 1 in. prep. 1st		0/9/6 — 0/14/6
Do. 2nd		0/7/0 — 0/11/6
Other qualities—		0/5/0 — 0/6/6
Cedar, Cuba	ft.	/3½ — /4½
Honduras, &c.		/3½ — /4½
Mahogany, Cuba		/3½ — /6
St. Domingo, cargo av.		/3 — 1/6
Mexican do. do.		/3 — /4
Tobasco do. do.		/3½ — /6
Honduras do.		/3½ — /5½
Box, Turkey	ton	4/0/0 — 13/0/0
Rose, Rio		7/0/0 — 18/0/0
Bahia		6/0/0 — 17/0/0
Satin, St. Domingo		0/0/5 — 0/1/0

TIMBER (*continued*).		
Satin, Porto Rico		0/0/6 — 0/1/6
Walnut, Italian		0/0/3½ — 0/0/7
METALS.		
Iron—Pig, in Scotland	ton	2/3/9 — 0/0/0
Bar, Welsh, in London		5/12/6 — 5/15/0
Do. do. at works in Wales		5/2/6 — 5/5/0
Do. Staffordshire, in London		6/0/0 — 6/10/0
COPPER—British cake and ingot		44/0/0 — 44/10/0
Best selected		44 10/0 — 45/0/0
Sheets, strong		54/0/0 — 0/0/0
Chili, bars		41/12 6 — 41/17/6
YELLOWMETAL	lb	0/0/4½ — 0/0/4½
LEAD—Pig, Spanish	ton	9/17/6 — 9/18 9
English com. brands		10/0/0 — 0/0/0
Sheet, English, 6 lbs. per sq. ft. and upwards		11/0/0 — 11 2 6
Pipe		11/15/0 — 0/0/0
ZINC—English sheet	ton	18/10/0 — 19/0/0
Vieille, Montagne		19/10/0 — 0/0/0
TIN—Straits		74/0/0 — 74/10/0
Australian		74/5/0 — 74/15/0
English Ingots		73/10/0 — 74/0/0
Banca		74/0/0 — 74/10/0
Billiton		72/10/0 — 73/0/0
OILS.		
Linseed	ton	20/12/6 — 21/0/0
Cocoanut, Cochin		29/10/0 — 0/0/0
Do. Ceylon		24 15/0 — 25/0/0
Palm, Lagos		25/10/0 — 0/0/0
Rapeseed, English pale		22/0/0 — 24/5/0
Do. brown		22/10/0 — 22 15/0
Cottonseed ref.		20/5/0 — 21/5/0
Oleine		22/0/0 — 24/0/0
Lubricating, U.S.		4/0/0 — 5/0/0
Do. refined		5/0/0 — 12/0/0
TAR—Stockholm	barrel	0/10/0 — 0/0/0
Archangel		0/11/0 — 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursday.*]

ACCRINGTON. — For excavating, sewering, paving, &c., a number of streets, for the Corporation. Mr. Wm. L. Newton, C.E., Town Hall, Accrington:—
George Cunliffe & Son, 116, Water-street, Accrington
W. H. Bury, Union-road, Oswaldtwistle
F. T. Stanley & Son, Avenue Parade, Accrington
} Schedule of Prices.

BLACKHEATH.—Alterations to 48, Lee Park, for Mr. E. Norfolk. Mr. J. Coates-Carter, architect, Cardiff:—

General Builders' Work and Decoration.

Turnbull & Son, Northumberland-alley, Fenchurch-street, E.C. £920 0

Drainage, Water Supply, and Gas.

The Banner Sanitation Company, 24, Craven-street, Charing Cross, W.C. 357 10

£1,277 10

BLAYDON-ON-TYNE.—For the supply of whinstone and limestone, for the Local Board. Mr. W. S. Simpson, Surveyor, Blaydon:—

For Rubble Limestone.

Alston and Nentforce Quarry Co., Alston, Cumberland ..... 5s. 9d. per ton.

For Whinstone (Rubble).

Northumberland Whinstone Co., Newcastle-on-Tyne ..... 7s. per ton.

BOURNEMOUTH.—For the erection of a new ward block and additions to the administrative block at the Sanitary Hospital. Mr. F. W. Lacy, Borough Engineer and Surveyor:—

F. Hoare & Sons	£4,347	S. Whitaker	£3,975
J. McWilliam & Son	3,985	J. White (accepted)	3,750

[Two informal tenders were received.]

BRIGHTON.—Accepted for fittings of shop, &c., at No. 10, St. James-street, for the Sussex Co-operative Drug Company, Limited:—
H. G. Fisher, 87, Judd-street, W.C. £186

BRIGHTON.—Accepted for alterations and additions at No. 7, London-road, for Messrs. Barnes & Barnes. Mr. Arthur Loader, architect, Old Steine:—
H. G. Fisher, Judd-street, W.C. £262 10

CARDIFF.—For alterations in the iron-work of Taff and Ely Bridges, Penarth-road; also cast-iron water-pipes, &c., for the Corporation. Mr. J. A. B. Williams, Waterworks Engineer, Town Hall, Cardiff:—

John Casey	£433 0	Franklin Jackson	£156 5
Geo. Kyte & Co.	230 0	Batchelor & Snowdon	140 0
"	101 15	H. A. S. Fraser, Partridge-road, Cardiff*	132 10
Joseph Thomas	210 0		
Ed. Henry Page	156 15		

*Accepted.

CHELMSFORD.—For a villa to be built on the Broomfield-road. Mr. R. Mawhood, architect, 2, Market-road, Chelmsford:—

Smith & Son	£895 0 0	Samms	£815 0 0
E. Saltmarsh	837 6 6	W. Fincham, Chelmsford (accepted)	795 0 0
E. West	834 0 0		

CHURCH STRETTON (Salop.).—For additions to hotel, for the Stretton Hotel Company. Mr. John R. Withers, architect, Shrewsbury:—
Bickerton & Maddocks £640
Thos. Morris, Shrewsbury (accepted) 488

CHELSEA, S.W.—For the erection of a doctor's house and nurses' quarters, at the Infirmary, Cale-street, Chelsea, for the Guardians of St. Luke, Chelsea. Messrs. Lansdell & Harrison, architects 12, Compton-terrace, Highbury, N. Quantities by Messrs. Northcroft, Son, & Neighbour:—

		Credit for old material.
F. W. Britton	£11,200	£80
G. Wade	10,700	50
J. H. Newman	10,500	60
Battley, Sons, & Holness	10,447	100
B. E. Nightingale	10,389	150
F. Dupont	10,097	110
E. P. Bulled & Co.	9,880	45
Wm. Norton	9,731	50
F. & H. F. Higgs	9,675	225
H. L. Holloway	9,643	—
G. Minter	9,670	45
Lorden & Sons	9,069	79
Wm. Smith, Eldon Works, Harley-ford-road, S.E.*	9,125	125

* Accepted conditionally

CORK.—For the erection of a chapel, Wilton, for the Society of African Missions. Mr. D. J. Coakley, architect, 86, South Mall, Cork:—

Stp. Sculley, Cork *	†£1,027	* Accepted	
T. O'Flynn	‡ 2,180	† Labour only.	
D. Ford	‡ 2,240	‡ Labour and Materials.	

CRAVEN ARMS (Salop.)—For the restoration of and additions to St. Cuthbert's Church, Clungunford. Mr. Edward Turner, architect, Leicester:—

Edwin Whittingham	£2,430	Henry Smith, Kidderminster*	£2,335

* Conditionally accepted.

DEWSBURY.—For the erection of farmstead and house, Mitchell Laithes Farm, Earlsheaton, for the Corporation. Quantities by Mr. C. Keyworth:—

J. C. Hombell	£7,315 11 3	John Audsley	£6,051 5 4
Scott & Sons	6,038 19 11	Mark Scott, Earlsheaton (accepted)	5,648 12 5
S. Booth & Spedding	6,008 7 7		

FERMOY (Ireland).—Accepted for the erection of two labourers' cottages, for the Union Guardians:—
Daniel Hayes, King-street, Fermoy 256

GAILEY-CUM-HATHERTON (Staffs.).—For partly rebuilding and enlarging the National Schools. Messrs. J. R. Veall & Son, architects, Wolverhampton:—

J. Reynolds	£277 0	A. Gilbert, Penkridge*	£260 10
H. Gough	270 0	* Accepted.	

GRAVESEND. — For alterations, &c., to school buildings, Milton-road, for the U.D. School Board. Messrs. G. R. & G. W. Cobham, Edwin-street, Gravesend:—

Builders' work.

H. W. Martin	£195 0 0	W. J. Wyatt, 78, Windmill-st., Gravesend*	£103 0 0
Philby	130 15 6		

Hot-water work.

Sugg & Co.	£152 0	Bailey	£113 0
J. F. Clark & Sons	132 13	Fowle Bros., King-street, Gravesend*	95 10
James Gray	125 0		
Worms	113 18		

* Accepted.

GREAT YARMOUTH.—For addition, &c., to school buildings, Church-road, Gorleston, for the School Board. Mr. H. Dudley Arnott, architect, High-street, Gorleston, Great Yarmouth:—

Moore & Wright	£1,468 10	Flaxman	£1,324 0
Read & Curtis	1,441 10	F. Grimble	1,299 0
J. Balls	1,422 0	J. W. Cockrill & Sons	1,266 0
F. W. Bray	1,422 0	G. Beckett, South Town, Great Yarmouth*	1,238 0
J. Ward	1,364 0		

* Accepted.

HASSOCKS (Sussex).—For additions to South District schools for the Clayton and Keymer U.D. School Board. Mr. Arthur Loader, architect, 54, Old Steine, Brighton:—

Mirriam	£590 10	G. Lockyer	£835 0
Dyke	895 0	Allfree	798 0
Saunders & Son	894 0	Holland	797 0
W. Oram	839 0	W. Taylor, Brighton*	720 0

* Accepted.

HOVE (Sussex).—Accepted for road-making, paving, &c., Westbourne-street, for the Commissioners. Mr. H. H. Scott, Town Surveyor, Town Hall, Hove. Quantities by Messrs. Nunn & Hunt, Brighton:—
J. Parsons & Sons, Church-road, Hove £195
[Lowest of three tenders.]

KEW and SOUTH EALING. — Accepted for building five houses and shop, for Mr. J. King, West Kensington:—
Smith, Avenue-road, Shepherd's Bush £1,180

LEAMINGTON.—Accepted for laying new sewers, Regent-grove, &c., for the Corporation. Mr. de Normanville, Borough Engineer, Town Hall, Leamington:—
R. Bowen, Leamington £980

LINCOLN.—For alterations and additions to the "White Hart" Hotel, Bailgate, for Messrs. Whitton & Ashley, wine and spirit merchants. Mr. Wm. Scorer, architect. Quantities supplied:—

Wright & Son	£1,285 0	J. W. Harrison	£1,143 0
H. S. & W. Close	1,210 0	Lansdown & Son*	1,138 9
Martin & Sims	1,147 0	* Accepted.	

LITTLE OAKLEY, (Essex.)—For additions to school buildings, including new cloak-rooms. Mr. W. Jacomb Gibbon, architect:—

Gunn	£230 0	E. Saunders, Dovercourt, Harwich*	£167 10
Kedge	227 0	* Accepted.	
Firmin	209 8		
Smith, Beaumont, and Dawson	195 0		

LIVERPOOL.—For the erection of a depôt manager's residence, &c., Richmond Lodge estate, Smithdown-road, Toxteth Park, for the Local Board. Mr. Jno. Price, C.E., Public Offices, Surveyor:—
Thomas Spencer, Bull Bridge, Aintree, near Liverpool* £2,100
(* Being exactly the amount of Surveyor's estimate.)

LONDON.—For the supply of 2,000 ft. run Aberdeen or Guernsey straight kerb, and 500 ft. of circular-edge kerb, for the Bermondsey Vestry. Mr. F. L. Samuel, Surveyor, Town Hall, Spa-road, Bermondsey, London, S.E.:—

	Aberdeen or Guernsey.		Guernsey.		Aberdeen.		Norway.	
	Straight.	Circular.	Straight.	Circular.	Straight.	Circular.	Straight.	Circular.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Fry Bros.	1 6	1 7½	—	—	—	—	—	—
A. & F. Manuelle, 101, Leadenhall-st.*	—	—	1 4½	1 6½	—	—	—	—
Cooper Bros.	1 7	1 9½	—	—	1 5½	1 7½	1 4	1 6

* Accepted.

LONDON.—For alterations to, and partly rebuilding, premises, together with fittings, and alterations to existing factory, Newington-butts, S.E., for Messrs. Rabbits & Sons, Limited. Mr. A. G. Hennell, architect, Mayard-road, Forest-hill. Quantities by Mr. J. R. Vining, 89, Chancery-lane:—

	New Premises.	Fittings and Alterations, Old Premises.	Total.
Bowyer Bros.	£14,100	£5,160	£19,260
Higgs & Hill	13,234	4,784	18,018
Holloway Bros.	11,916	5,050	16,966
Patman & Fotheringham	11,290	5,120	16,410
Lascelles & Co.	11,592	4,498	16,090
Clarke & Bracey	11,220	4,778	15,998
Colls & Co.	10,799	4,635	15,434
W. Johnson & Co.	10,930	3,667	14,597
Burman & Sons	10,500	3,600	14,100
Turtle & Keppleton	10,400	3,500	13,900

LONDON.—For alterations to premises, Berners-street, W. Messrs. Bennett & Jackson, architects, 72, Cheapside:—

Drew & Cadman	£1,118	Geo. Parker, Peckham*	£996
J. Smith & Sons	1,090		

* Accepted.

LONDON.—Accepted for the erection of two residences, Exeter-street, Chelsea, S.W. Mr. J. J. Stevenson, architect, London. Quantities by Mr. W. H. Elsmore, Barnes:—

Stephens, Bastow, & Co., Ltd., Bristol £7,700

LONDON.—For alterations to the "Britannia" publichouse, Kingsland-road. Mr. George Carter, architect, 513, Holloway-road:—

Courtney & Fairbairn	£1,179	Spencer & Co.	£1,080
Barker	1,134	Edwards Medway	1,074
J. Boreham & Son	1,119	Steven Bros.*	995

* Accepted

LONDON.—For alterations to Nos. 192 and 193, Upper-street, Islington, for Mr. W. I. Lewis. Mr. Edmund J. Harrison, architect, 12, Compton-terrace, Highbury, N.:—

Ward & Lamble	£245	E. Houghton & Sons, Stroud Green, N.* (accepted)	£148
Gardner & Hazell	202		
J. Milroy	193		

LONDON.—For alterations to No. 123, Cornwall-road, W. Mr. W. Wonnacott, architect, 106, Lancaster-road, W.:—

G. W. Wilkinson & Sons	£460 0
J. P. Williams (accepted)	419 10

PENRHIWCEIBER (Wales).—For the erection of a villa, Railway-terrace, for Mr. Rees, Rheola-street, Penrhiwceiber:—

Hugh Owen	£364	Dd. Harris, Mountain Ash*	£260
Howell Thomas	325		

* Accepted.

POOLE.—For the execution of sewage works, for the Urban Sanitary Authority. Mr. John Elford, Borough Engineer, Poole:—

	Contract No. 1.	Contract No. 2.	Contracts Nos. 1 & 2.
F. Reeks, Lymington	—	£13,770 0*	—
Bell & Co.	—	14,184 0	
W. H. Saunders & Co.	—	14,409 17	—
G. Rutter & Co., Barry	£1,975 4 6*	£14,774 0	
W. Hoare	—	14,805 0	—
G. Troke	—	14,965 0	—
Jas. Dickson	3,983 0 0	14,983 0	£18,966 0 0
J. T. Whettam	2,620 0 0	15,238 0	—
S. Minty	—	15,600 0	—
George Ossenton	2,511 0 8	16,599 0	19,111 0 0
John Neave	2,460 0 0	16,940 0	19,240 0 0
B. Cooke & Son	3,900 0 0	17,480 0	21,000 0 0
T. C. Rigler	—	17,564 0	—
John Jackson	—	17,990 0	—
Cochrane & Son	3,000 0 0	21,002 0	24,000 0 0
Dorset Iron Foundry Co.	6,457 9 10½	—	—
Godfrey & Son	—	—	32,201 2 5
J. Mowlem & Co.	—	—	33,622 0 0

* Accepted.

PORTSMOUTH.—For the construction of a road, footpaths, and main sewer, Fratton, for the Urban Sanitary Authority. Borough Engineer of Portsmouth:—

T. P. Hall, Bedford-road, Southsea* .
F. Bevis ..... } Schedule of Prices.
T. W. Quick ..... }

* Accepted.

PUDSEY (Yorks.).—For the execution of sewerage works (Contract No. 2) for the Local Board. Mr. Cass, Surveyor, Market-place, Pudsey:—

John Simpson, Hunslet-road, Leeds £3,100

RICKMANSWORTH.—For the erection of a detached villa residence, for Mr. T. E. Nobbs. Mr. Edmund J. Harrison, architect, 12, Compton-terrace, Highbury, N.:—

Brown & Sons	£800	J. Green, Northwood*	£741
J. Holland	799	E. Eames	725

* Accepted.

SOUTHWOLD (Suffolk).—For the construction of pipe-sewers, sewage-tanks, filter-beds, &c., for drainage of the Borough, for the Town Council. Mr. Frederick Beesley, M.Inst.C.E., 11, Victoria-street, Westminster, London, S.W.:—

J. L. Cattell	£6,387 0 0	B. H. Carter	£5,650 10 6
Geo. Osenton	6,193 0 0	Geo. Bell	5,569 0 0
Macandrews & Co.	6,150 0 0	W. J. Chilvers	5,495 11 6
Girling & Co.	6,090 0 0	James Dickson	5,421 0 0
B. Cooke & Co.	5,950 0 0	Herbert Weldon	5,400 0 0
John Neave	5,883 0 0	Geo. Double	4,770 0 0
Solden Hipwell	5,673 10 0		

STAINLAND (Yorks.).—For the supply of flags and setts, Outlane, for the Local Board. Mr. James H. Walker, Surveyor, Local Board Offices, Mechanics' Hall, Stainland:—

	Per yard run.
Flags.—Jno. Whiteley & Sons, Scammonden	£0 2 6
Setts.—S. Broadbent & Sons, Sowood	0 2 8
Flagging, &c.—John Helliwell, Stainland	0 1 1
Setting, &c.— " " "	0 0 9

STOURBRIDGE.—For the construction of 5,800 yards earthenware and iron-pipe main, intercepting sewers, &c. (Contract No. 1), for the Upper Stour Valley Main Sewage Board. Messrs. Marten & Fiddian, engineers, Church-street Chambers, Stourbridge:—

Thos. Philbrick	£5,416 17 9	Henry Hill	£4,041 2 0
Jacob Biggs	5,132 0 0	George Law	3,834 0 0
Jones & Fitzmaurice	4,970 0 0	John Guest & Sons	3,641 11 10
John Mackay	4,512 5 3	Thomas Vale, Kidderminster*	3,370 0 0
George Bell	4,501 0 0		
Cruwys & Hobrough	4,069 6 11		

*Accepted.

SWINDON.—For rebuilding the "Bell and Shoulder of Mutton" Inn, Marlborough-road. Mr. W. H. Read, architect, Corn Exchange, Swindon:—

C. Williams	£1,237 0	J. Williams, Swindon*	£1,187 17 0
G. Wiltshire	1,235 10		
T. Barrett	1,228 10		

*Accepted.

TUNBRIDGE WELLS.—Accepted for new fittings, door, &c., of shop at No. 10, High-street, for the Sussex Co-operative Drug Company, Limited:—

H. G. Fisher, Judd-street, W.C. £272

WOOPERTON (Northumberland).—Alterations to four cottages. Mr. George Reavell, jun., Alnwick, architect:—

Bryden & Son, Glanton.		Walter Allen, Wooler,	
R.S.O.	£403 10 0	R.S.O.*	£365 10 6

* Accepted.

WORTHING.—Accepted for inside fittings, &c., of No. 2, South-street, for the Sussex Co-operative Drug Company, Limited:—

H. G. Fisher, Judd-street, W.C. £206 10

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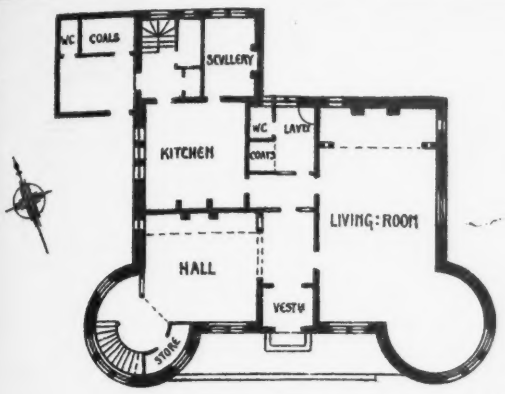
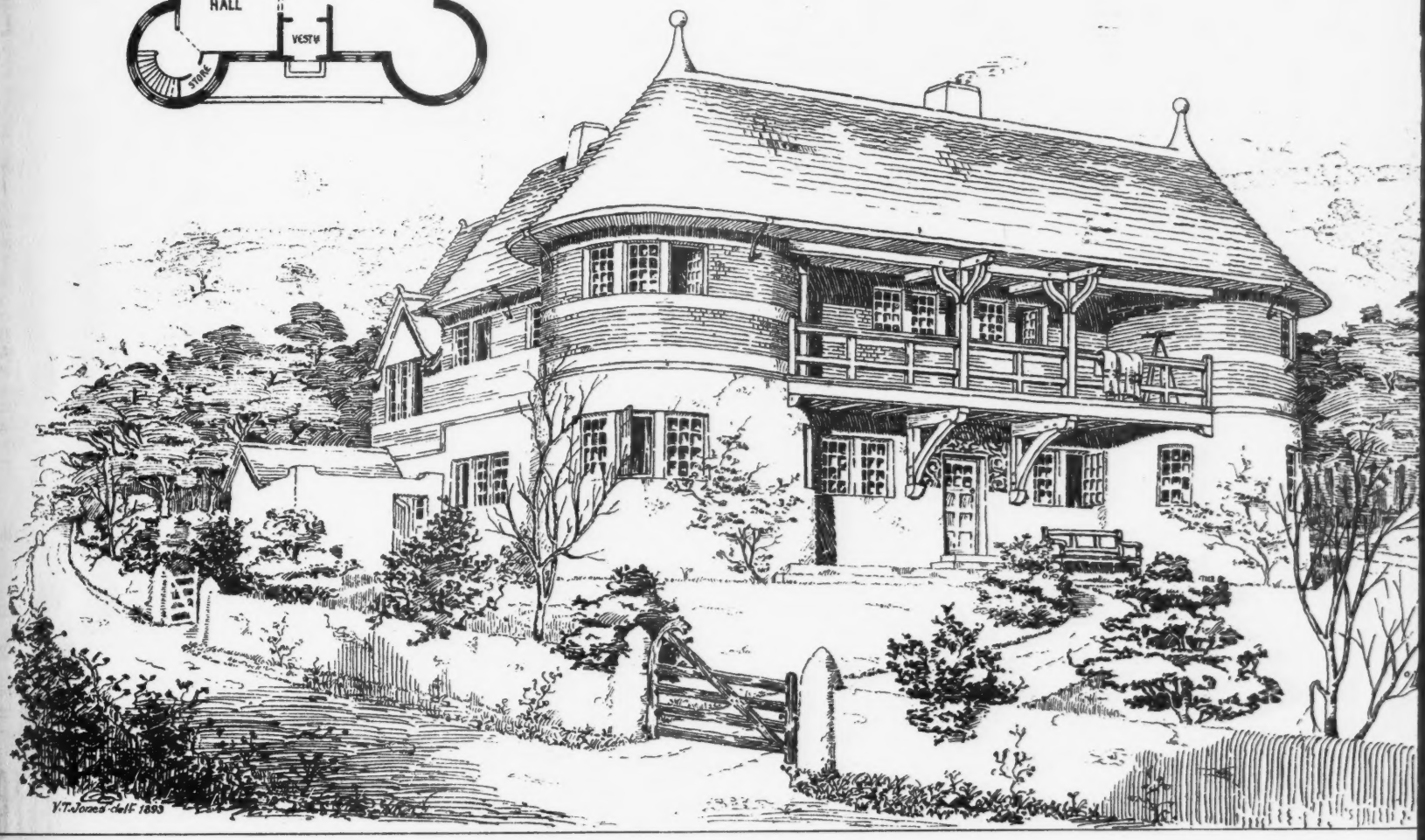
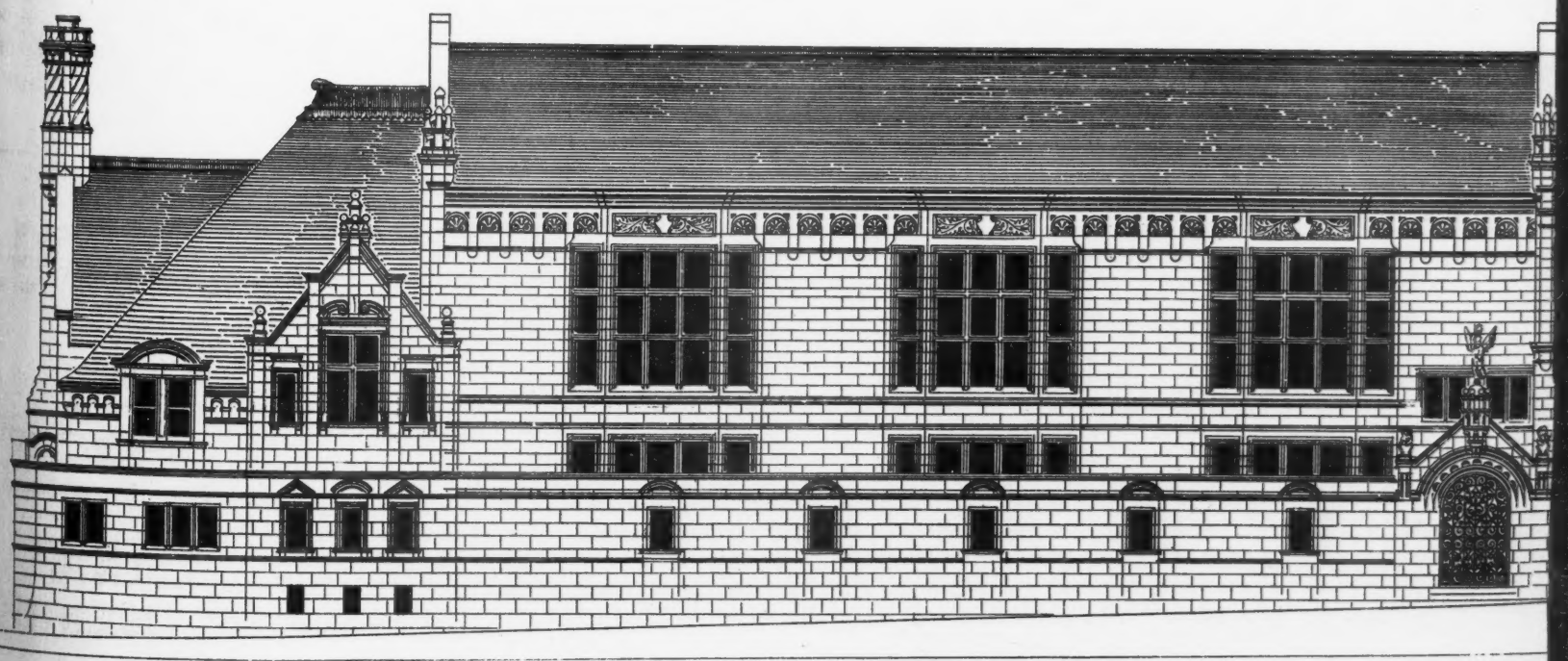






COMPETITIVE DESIGN FOR DARLINGTON MUNICIPAL BU

Royal Academy Exhibition, 1894.

places or stoves, or of hot-water or steam-pipes, or of electricity, that a combined system of heating many houses from one central source can be arranged, or has been attempted. In the United States the earliest efforts were made to obtain a combined system of heating by steam for towns and villages by Mr. Holly. The broad principle which the Holly Steam Combination Company enunciated is that of furnishing heat from a central source of supply applicable to all domestic purposes, just as gas and water are supplied. The boilers are placed in a convenient central situation. From the boiler the steam passes into the main pipes, and lateral or branch pipes. The maximum steam pressure was about 100 lbs. per square inch. Since, in the conveyance of steam for a long distance, it is essential to guard against condensation or loss, great pains are necessary to cover the steam-pipes with non-conducting material. In order to effect this, the pipe is wound about first with asbestos, followed by hair felting, porous paper, manilla paper, finally thin strips of wood laid on lengthwise, and the whole fastened together by a copper wire, wound spirally over all. This is thrust into a wooden log bored to leave an intervening air-chamber between the pipe and the wood, and of sufficient size to leave from 3 in. to 5 in. of wood covering. By this means it is alleged that the loss of heat is little over 2½ per cent. Careful arrangements have to be made for admitting the steam into the houses, both to prevent loss and to ensure measuring it. It is not intended in this paper to go fully into the engineering details of this method. They can be obtained from the engineers who have constructed works in the United States. The system is especially applicable to countries where the winters are uniformly and persistently cold. In England the variations of temperature are so frequent and rapid, that whilst much heat is required at one part of the day, at another time this is not the case, consequently the frequent changes would make it difficult to provide economically for heating over a large area. The economy of steam heating depends on using low pressure steam and letting the water of condensation flow continuously back to the boilers, so that there should be no waste. This ought to be the arrangement in all isolated houses, hospitals, &c., but it is an arrangement which is not practicable where steam is distributed over large areas. The great advantage of furnishing heat from a central source of supply applicable to all domestic purposes, just as we get our gas and water, is, that it saves the annoyance of handling coal-ashes, kindling, &c.; also the expense of stoves and repairs. In the United States the charge adopted by some of the steam companies for steam was eight shillings per thousand cubic feet of air space per annum. Under this lump sum system a house of 60,000 cubic feet contents, which is about the capacity of a fair class London house, would pay about 24*l.* a year for heat, whilst an artisan in a model dwelling, which occupies probably from 6,000 to 8,000 cubic feet, would pay from 2*l.* 4s. 0d. to 3*l.* 4s. 0d. for heat a year, equivalent to from 10d. to 1s. 3d. a week. This is in the United States, where the winters are intensely cold, and where a very considerable amount of heat is necessary during the whole winter. On the other hand, by the introduction of meters made to register so as to pay for the steam actually used instead of by the cubic space, individuals might effect a reduction of cost by cutting off the steam from the radiators in unoccupied rooms. On a review of the whole question, it is evident that much advantage to the population in a town would result from a central source of heat, without the inconvenience of having to carry fuel to every house. In a moderate-sized house the annual consumption of coal will not be less than 20 tons. These are stowed away in cellars, and then raised thence in scuttles which hold about 28 lb. each—that is to say, at least 2,000 separate coalscuttlefuls have to be taken to various parts of the house, the ashes brought down again, and much labour devoted to removing the dust with which an open fire covers the furniture. Hence the complete use of steam would enable probably one female servant to be dispensed with. In artisans' houses the saving of trouble by having no fires to attend to, no grates to clean, and no coals to carry, would be of much value. In addition to this, each fire deposits much soot in the chimney, which at regular intervals is pushed up into the air by the chimney-sweep, and thus distributed through the neighbourhood, rendering continued cleaning necessary and compelling a large annual outlay in repainting and redecorating. There is also a great inconvenience to street traffic caused by distributing coals to every house in every street. It is not, however, certain that steam would supply the most convenient form of heat. There is no doubt that with heating as with lighting, electricity would furnish the most manageable and the most hygienic form of heating. But it would be very expensive. Hence it is probable that eventually, rather than adopt a system of steam-heating, it might be found more simple and economical to supply a cheap form of gas for all of what may be termed the rough part of heating, including cooking; whilst the more delicate final touches in heating for high-class houses could be supplied by electricity."

The paper of M. Émile Trélat treated the theoretical part of the subject in terms almost identical with those of Sir Douglas Galton. M. Trélat drew the conclusion that there are only two modes of establishing in dwellings hygienic conditions of heating. Whether for hotels or private houses the true solution of the problem depended upon the maintenance in the walls of our houses of such a degree of heat as will ensure that the physiological temperature of the occupants will not be disturbed. In the practical application of the theory, Professor Trélat divides dwellings into two classes (*a*) those which, like schools, are occasionally unoccupied, where the heating apparatus may be employed during the intervals of vacancy, and (*b*) those, which, like hospitals, are permanently occupied, where the heat must be distributed by radiation. In the latter case stoves with large radiating surfaces should be employed, or the heat must be circulated by means of pipes conveying hot air or water. The solution of the problem of heating dwellings had absolutely no connexion with that of their ventilation.* In concluding his paper, M. Trélat passed a warm eulogium upon the English open hearths—"Those open fireplaces which cast through the dwelling the bright perspective of brilliant combustion, and afford the delightful convenience of immediately warming one or more of the members of the body on getting home on a cold night."

Professor Banister Fletcher, who opened the discussion, said that Sir Douglas Galton appeared to be of opinion that gas would continue to be the heating and cooking power of the future, and that while electricity might be an elegant luxury, its great cost would prevent its general employment, except among the rich. The remarkable and successful experiment recently carried out in the City of London before the Lord Mayor and a large company, in cooking a dinner by electricity, scarcely seemed to have received adequate appreciation, and the paper also ignored the demonstrations which had recently taken place at King's College, in the economical application of electricity to cooking and other domestic purposes. Of course, it was a matter of common knowledge that by using a thick wire electricity was obtained with great heating but little lighting power, while with a thin wire much light but little heat was given out. But the fact appeared to have been overlooked in the paper. A loss of 2½ per cent. of the steam used for heating purposes in the American apparatus described had been mentioned, but the paper did not say how far the steam had to travel. The cost of steam-heating for a cottage on the principle described was set down at from 10d. to 15d. per week, but if steam could not be supplied at a more moderate rate than that, the working-men in England would not be easily persuaded to adopt that method, whatever might be the practice in America.

Professor Corfield said the principle seemed at least practicable, and he thought it the correct one. Heating should be done by means of radiant heat, and not by means of air previously warmed. If air was previously warmed it would lose a portion of its oxygen, and if we got air short of oxygen we had to breathe a greater number of times to supply the required amount, and that meant more effort. Premises should not be previously warmed.

Mr. Blashill (London) was satiafied that the breathing of warmed air was not refreshing. Some means must be found to make the air warm in very cold winters. In the climate of that country (Hungary) the gas-stove was as much a necessity as the open fireplace in England. He had seen at Hildesheim in Germany a combination stove, well calculated to supply both *desiderata*, and it was the best kind of stove he had seen for warming buildings in a very cold atmosphere.

The Chairman (Mr. Cates), after a brief criticism from Herr F. Siemens (Dresden), who subsequently read a paper on "Heating by Gas," and remarks by one or two other speakers, wound up the debate. He said the discussion had been of great interest, and was well worthy of the most careful consideration. A point not mentioned he hoped would not be lost sight of—the means of warming in staircases. They ought to guard against the loss caused by letting the air cool during the night, which necessitated a great extra expense for re-heating in the morning. That was avoided in Germany by the use of the stove, as pointed out by Mr. Blashill. The admission made by M. Emile Trélat, who referred to the cheerfulness of the English open fire-grate, was significant, and if they could succeed in combining the cheerfulness of the open fire with the economy of the close stove, as used in North Germany, they would have solved an important problem.

The presidency having been transferred to Herr Steindl, architect of the new Houses of Parliament of Budapest, recently illustrated in the *Builder*, several German and Hungarian papers were read on heating by gas and electricity.

In other sections papers were read on the Shone system of sewerage, as carried out at Arad, in Hungary, by Mr. Parecz, Municipal Engineer of Arad; by M. Sijmons, C.E., of Rotterdam, on the "Liernur System of Sewage Treatment, as Carried out at Amsterdam"; by Dr. J. C. Thresh, Medical Officer of Health to the Essex County Council, on the "Hygiene of Drinking-Water"; by Mr. H. Robinson, C.E., on "Sewage and Water Purification by Filtration"; and by Dr. F. Stevens, D.P.H. (Camberwell), on "Men Employed in Sewers," the author taking a favourable view of the hygienic conditions under which such men carry on their occupations.

At the third sitting of the united sections dealing with the Hygiene of Public Buildings and Dwellings among the most important papers read were those of Mr. Th. W. Aldwinkle, F.R.I.B.A., on the "Planning of Fever Hospitals" and of Herr Ferdinand Fellner, architect, of Vienna, on the "Protection of Theatres from Fire;" Mr. Thos. Blashill, L. C. C., being unanimously voted to the presidential chair.

The Planning of Fever Hospitals.—Mr. Aldwinckle's paper was practically a description of the new Fever Hospital at Shooters' Hill, now in course of erection from the author's designs for the Metropolitan Asylums Board, of which the following are the leading points:—

The Asylums Board having found themselves, during the scarlet fever epidemic in London of 1892-3, in a serious deficiency as regards fever hospital accommodation, decided (after erecting two temporary hospitals) to erect three permanent fever hospitals, each for 500 beds, and the first one to be commenced was the Brook Hospital, the drawings for which were laid by Mr. Aldwinckle before the Congress. Before issuing their instructions for the preparation of plans, a specially-appointed Committee of the Asylums Board made a most exhaustive inquiry, extending over several months, as to the necessary requirements for a large fever hospital, and visited all the important and modern institutions of a similar character, with the result that the instructions issued to the architect were of the most complete and comprehensive character, and having been printed, formed, in the opinion of the author, the most complete and advanced text-book in existence on the subject of the requirements of a fever hospital. The Brook Hospital site is one which fulfils nearly all the requirements of an ideal hospital site. Placed at a level of over 200 ft. above the sea, and facing northwards towards Shooter's Hill-road, the land falls rapidly towards the south, so that the building can be arranged in terraces facing the south, so as to be shielded from the north and east winds. The main principles on which the hospital is designed are:—

Separate entrances for infected and non-infected business.

The separation of the staff quarters from infected buildings.

The complete separation of diseases.

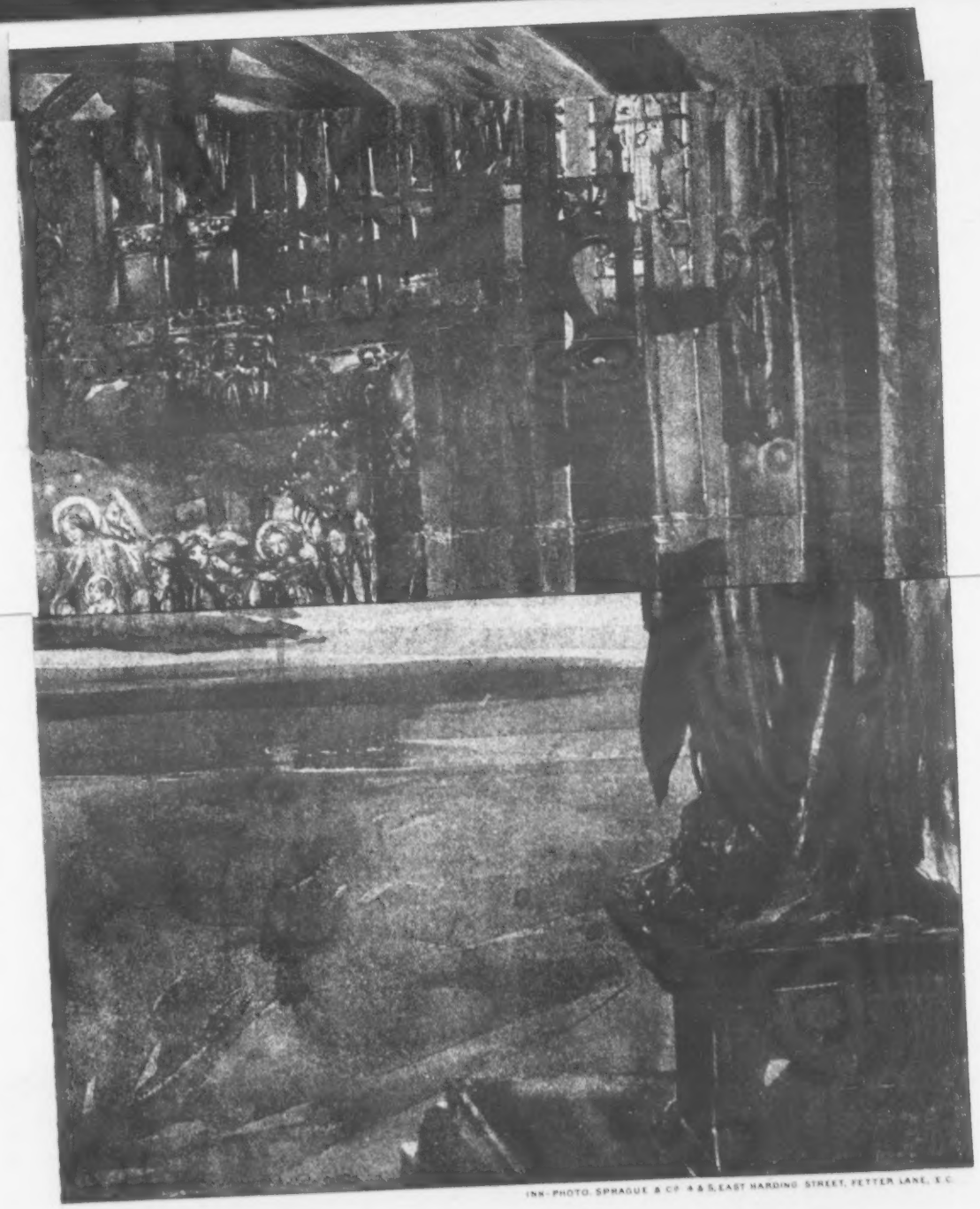
The isolation of alien diseases.

The provision of abundant light and air to all buildings.

The following is a general description of the plan. In the front portion of the site are placed the several administration buildings, such as the official block, the kitchen and stores, the matron's office and needle-room, the doctor's residence, and three homes, respectively for the nurses, female servants, and male servants. The main portion of the hospital proper, or the infected building, stands to the rear of the

* It is needless to say that we decline to accept M. Trélat's dictum on this point.—ED.

THE BUILDER, SEPTEMBER 22, 1894.



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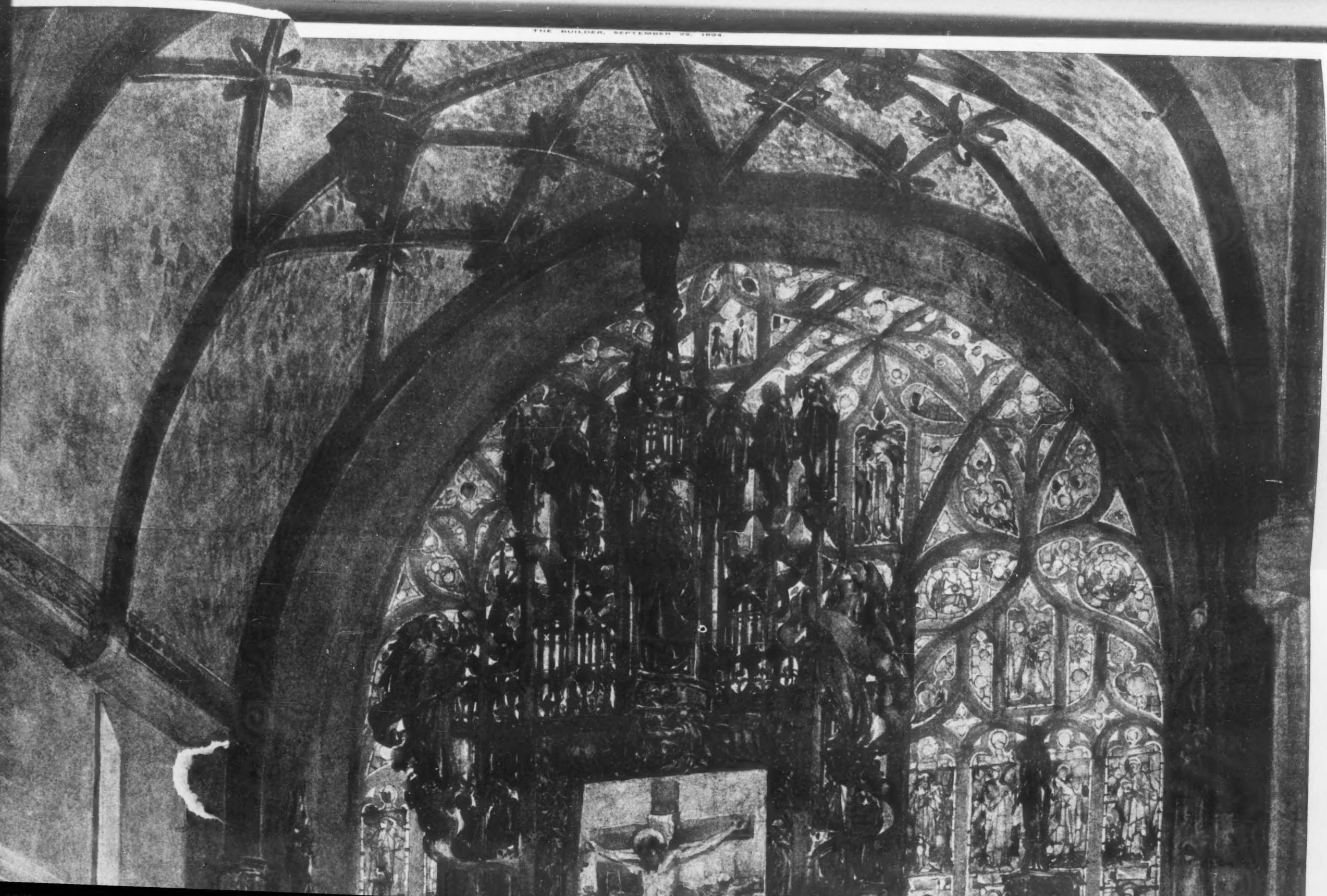

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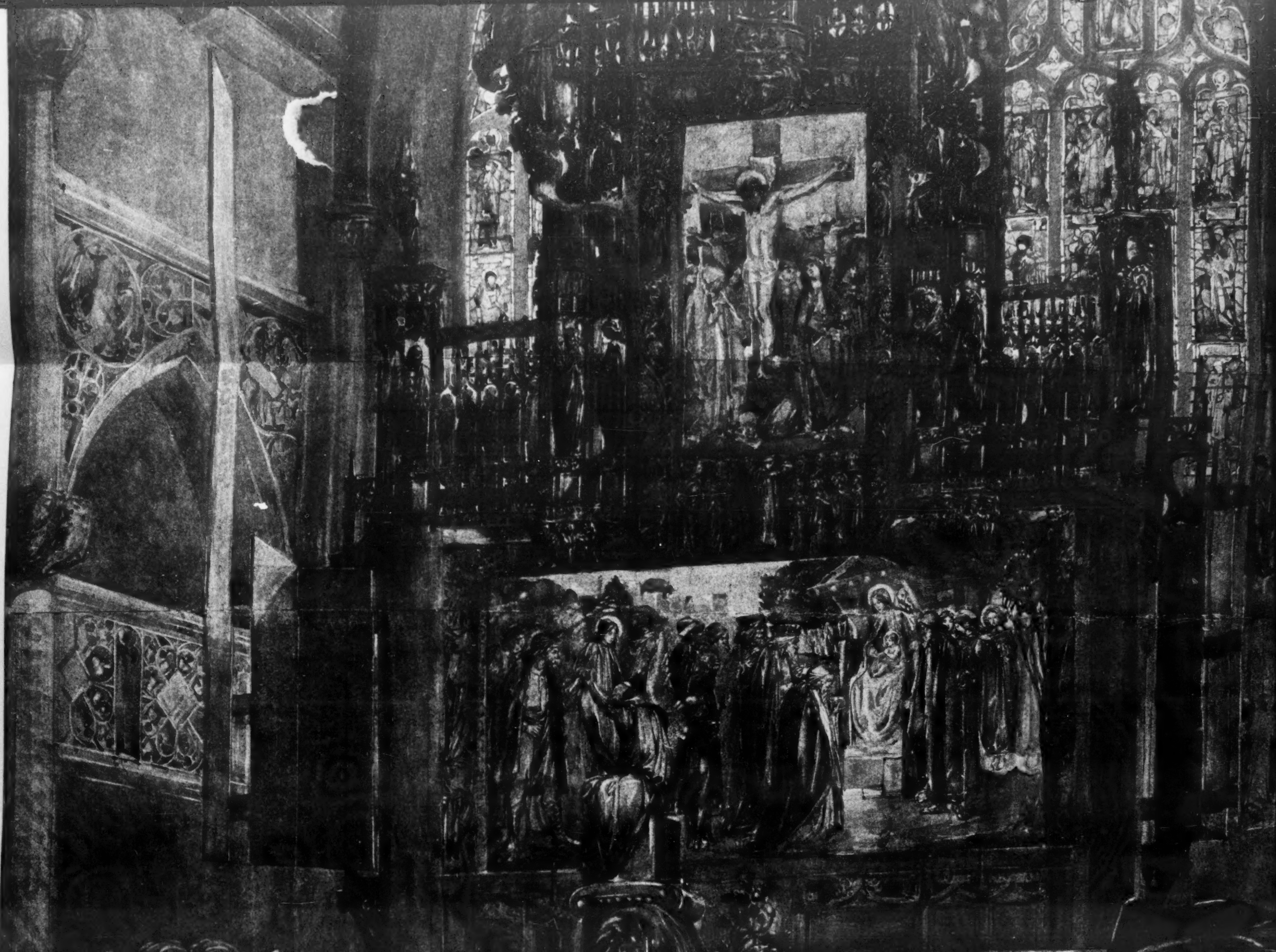
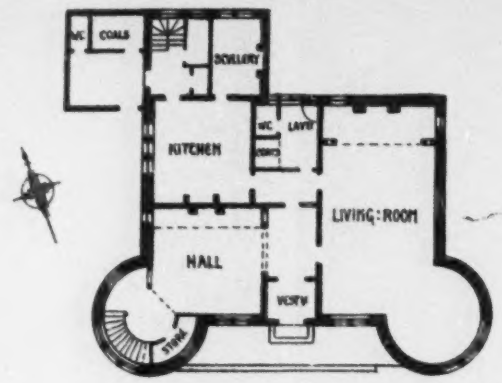
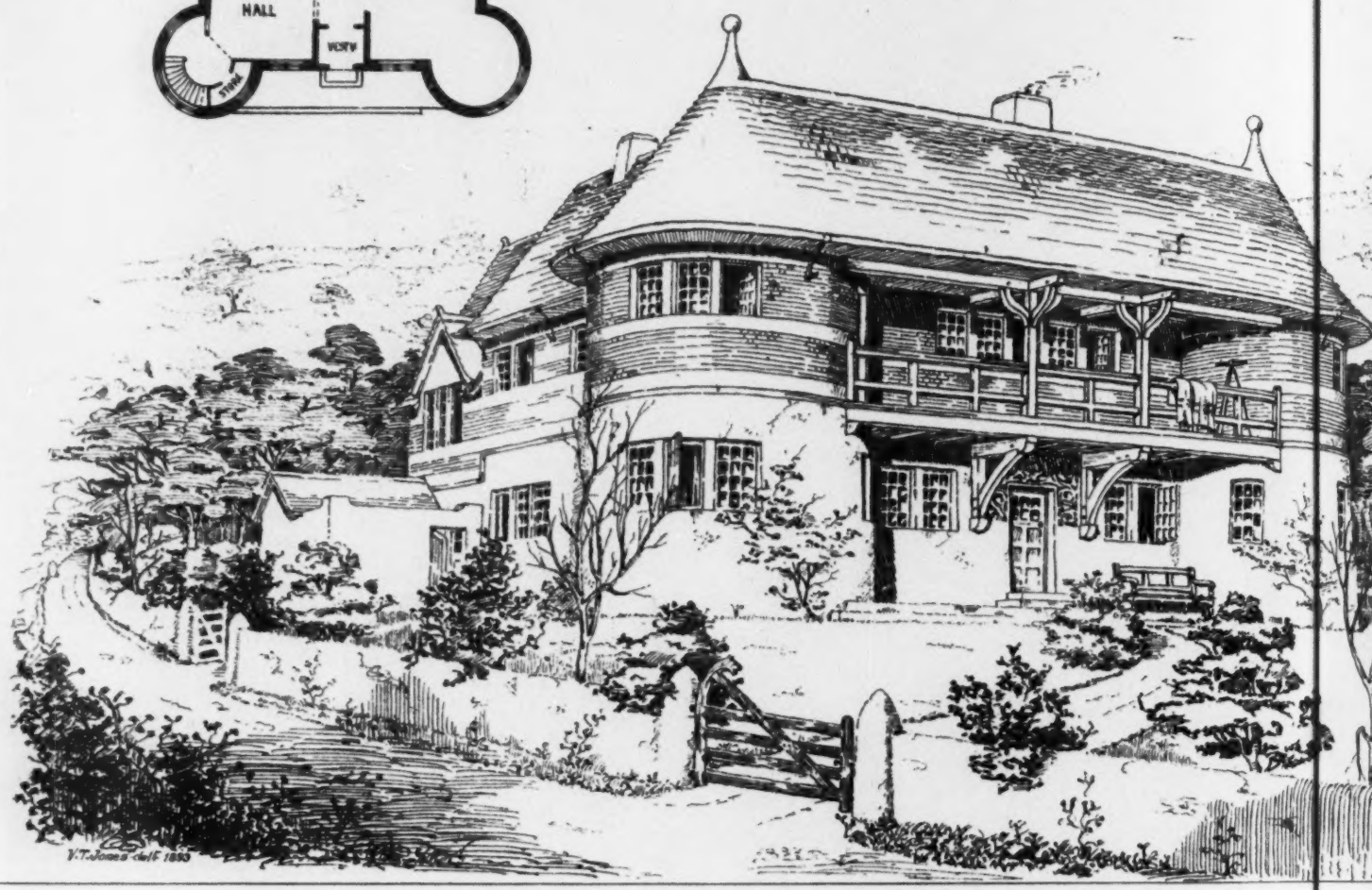
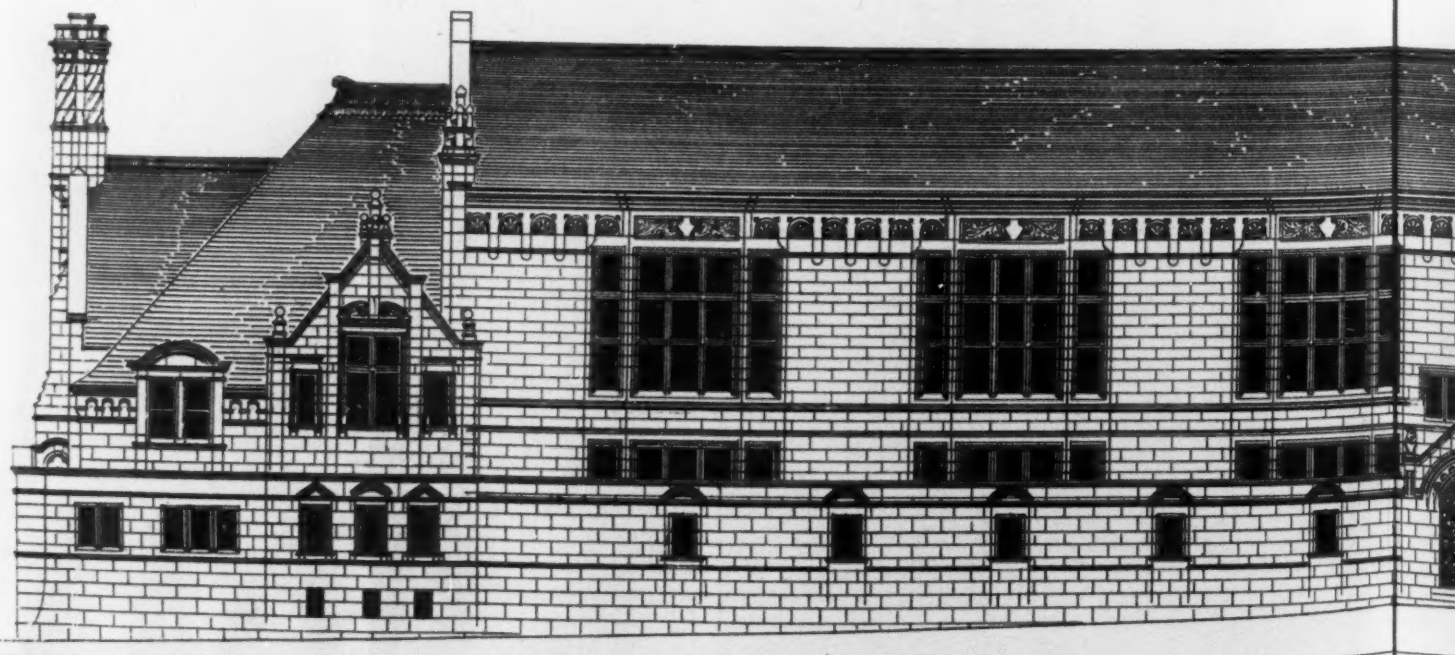


STUDY FOR PROPOSED REREDOS, HOLY TRINITY CHURCH, CHELSEA.—Mr. H. Wilson, Architect.

Royal Academy Exhibition, 1894.



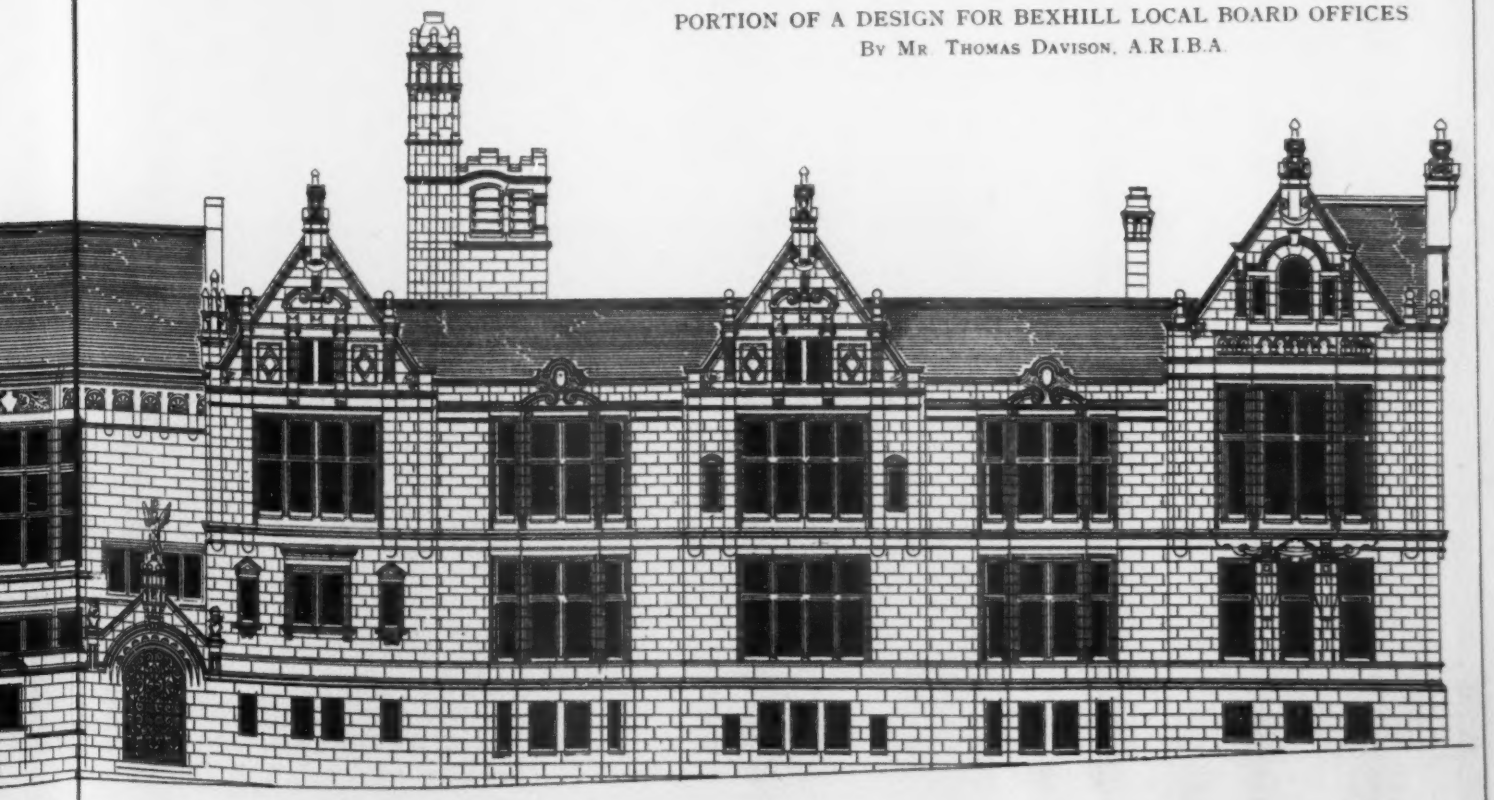




Royal Academy Exhibition, 1894.

COMPETITIVE DESIGN FOR DARLINGTON MUNICI

PORTION OF A DESIGN FOR BEXHILL LOCAL BOARD OFFICES
By Mr. Thomas Davison, A.R.I.B.A.



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GTON MUNICIPAL BUILDINGS.—By Mr. F. Pennington.

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NEW CONSERVATIVE CLUB HOUSE, GLASGOW.—Mr. R. W. Edis, F.R.I.B.A., Architect.

Royal Academy Exhibition, 1894.

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NEW CONSERVATIVE CLUB HOUSE, GLASGOW.—Mr. R. W. Edis, F.R.I.B.A., Architect.

Royal Academy Exhibition, 1894.